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Charles B. Fix

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PART I.

Comprising all the Documents transmitted to the
President from the

WAR DEPARTMENT.

18th CONGRESS, }
1st SESSION. }

[2]

DOCUMENTS

ACCOMPANYING

THE MESSAGE

OF THE

PRESIDENT OF THE UNITED STATES,

TO BOTH HOUSES,

AT THE COMMENCEMENT OF THE FIRST SESSION OF THE EIGHTEENTH CONGRESS



DECEMBER 2, 1823.

Referred to a committee of the whole on the state of the Union.



WASHINGTON :

PRINTED BY GALES & SEATON.

1823.

DOCUMENTS FROM THE WAR DEPARTMENT.

DEPARTMENT OF WAR,*November 29, 1823.*

SIR: In compliance with your directions, I herewith transmit statements from the Major General of the Army, and the several subordinate branches of this Department, lettered from A to M, which contain, in detail, a view of the administration, for the three first quarters of the year, of the various branches of the public service entrusted to this Department, comprising the Army, Military Academy, Fortifications, Ordnance, including the Armories, Military Pensions, Bounty Lands, and Indian Affairs.

The statements afford satisfactory proof, that order, accuracy, economy, and accountability, have been introduced into every branch of the Military service. It will be seen, by them, that the money appropriated by Congress had been applied with economy to effect the objects of appropriation; that the accounts have been made up with accuracy, and transmitted with promptitude to the proper Departments for settlement, and have there been settled without delay. The observations are true, with scarcely a single exception; and the result has been, that, of the entire amount of money drawn from the Treasury in the year 1822, for Military service, including the Pensions, amounting to \$4,571,961 94, although it passed through the hands of no less than 291 disbursing Agents, there has not been a single defalcation, nor the loss of a cent to the Government; and that the whole has been accounted for at the Treasury, except a small amount, which remains in the hands of the disbursing agents, ready to be applied to the objects for which it was drawn. The disbursements of the three first quarters of this year, have been equally satisfactory; and, there is every reason to believe, that no defalcation, nor any loss, will occur in the year. The administration in relation to Indian Affairs, though greatly improved, and the expenditure reduced fully one-half, is not as perfect as that of the Military branch of the Department, nor can it be made so, unless rendered equally perfect in its organization. It is impossible, under the present arrangement, that the minute and constant attention to its details, which is indispensable to a perfect administration, can be bestowed.

But, it is not only in its disbursements that the Military Service has attained a high perfection. The condition of the Army, in every branch, both of the Line and Staff, in its material and personal, and in its discipline and administration, is highly respectable. If there is any exception, it is in the discipline of the Artillery. Though the officers of that branch of service are equal in skill to any other, and are distinguished for their attention to their duty, yet, it is found impracticable, dispersed as the Artillery is, in commands of single companies, to render the discipline of the corps as perfect as is desirable. It is contemplated, during the next year, to concentrate a sufficient number of Artillerists, for discipline, at some proper point, and, by rendering their discipline perfect, gradually extend the perfection, thus acquired, to the whole corps. It can be effected without additional expense to the public; and, it is believed, without material inconvenience to the service.

Of the Military Academy, it may, with confidence be said, that it has attained a state of perfection as great as it is practicable, under the existing legal provisions; and that it is not inferior to any similar institution in any country.

Under the appropriations of the last session, Forts Washington, Delaware, and the one at the Rigolets, will be completed; and it is contemplated, should appropriations be granted, to commence, in the next year, the works projected at New Utrecht, which is intended to cover Fort La Fayette, which commands the Narrows at New York, and those at Brenton's Point, for the defence of Narragansett Bay.

The Board of Engineers, besides its ordinary duties, were, during last summer, engaged in executing several special orders; and, among others, in projecting a break water at the mouth of the Delaware, under the act of the 7th of May, 1820, and the forming a plan for the improvement of the entrance into the harbor of Presque Isle, on Lake Erie. In relation to both these important subjects, it made very interesting reports, with plans and estimates, which accompany the statement from the Engineer Department, herewith transmitted.

The completion of the new fortresses, and those to be erected, will require an appropriation in order to fabricate the cannon and carriages necessary for their armament. It is estimated, that an annual appropriation of \$100,000 will, in ten years, furnish a sufficient number for all of the works contemplated for the defence of the coast. There would, undoubtedly, be great economy in granting a permanent appropriation instead of an annual one, as contractors would vest their capital at much less profit, under the assurance which would be afforded by the former.

Under the appropriation to fix on a site for a National Armory on the Western waters, made the last session, a commission, consisting of Col. M·Ree, Col. Lee, and Capt. Talcott was constituted, which has been incessantly engaged in exploring the country on the Western waters, in order to make the location. It has not yet reported, but

it is expected that it will make its report in the early part of the session of Congress.

In the month of June last, the Ricarce Indians, who inhabit the country on the Missouri, a little below the Mandan Villages, attacked General Ashley, with his party, while peaceably engaged in trading with them, at their request, under licence from the government, and killed and wounded several of his party. Colonel Leavenworth, who commanded Fort Atkinson, at the Council Bluff, adopted immediate measures of redress. With a part of his command he made a successful attack on the village, and compelled the Ricarees, after a considerable loss on their part, to sue for peace. Statement marked L, contains the correspondence in relation to the transaction, and exhibits a full view of the facts.

The Report from the Adjutant General's office, marked M, contains the returns of the Militia, according to the latest reports to that office. Returns from only three states have been received in the course of the year, though every effort has been used to ensure punctuality in making them.

I have the honor to be,

Your obedient servant,

J. C. CALHOUN.

The PRESIDENT

of the United States.

LIST OF DOCUMENTS

Transmitted from the War Department to the President, to accompany his Message to Congress.

- A. Report of Major General Brown, concerning the organization, distribution, and disbursement, &c. of the Army, from A to E.
- B. Report of the Quartermaster General, with accompanying Statements A and B.
- C. Report of the Commissary General of Subsistence, with Statements A and B.
- D. Report of Paymaster General.
- E. Report of Surgeon General.
- F. Statements of the Commissary General of Purchases, 3, 4, and 5.
- G. Report of the Engineer Department, with Tables D, E, and F.
- H. Report of the Ordnance Department, with Statements from A to E.
- I. Statement concerning Pensions.
- J. Statement of Bounty Lands.
- K. Statement of Indian Affairs.
- L. Correspondence relative to hostilities of the Arickaree Indians.
- M. Return of the Militia of the United States.

A.

HEAD QUARTERS OF THE ARMY,

Washington, Nov. 22, 1823.

SIR: In obedience to your order of the 5th instant, I have the honor to submit to you the following returns and statements, viz:

- A. A statement of the organization of the Army, agreeably to the act of Congress of the second of March, 1821.
- B. A return of the strength of the Army, from the last Regimental and other returns, received at Head Quarters.
- C. A statement of the distribution of the troops in the Eastern Department.
- D. A statement of the distribution of the troops in the Western Department.
- E. A statement showing the number of men enlisted, the amount of money advanced for the purposes of recruiting, and the amount for which recruiting accounts have been rendered for settlement, from first of January to first of October, 1823.

It will be perceived, from the last mentioned statement, that \$ 7,653 99 remains unapplied in the hands of recruiting officers. This sum is actually employed in the recruiting service, and will be embraced by returns not yet due. The uniform punctuality of the recruiting officers, in rendering their accounts, justifies the belief that it will, at the proper time, be regularly accounted for.

The tours of inspection, prescribed by the Army Regulations to the Commanding Generals of Departments, have been prevented, by unavoidable circumstances. In the early part of the year, a change of commands was arranged between these two officers; but, on the point of executing the arrangement, their movements were suspended by a rupture with the Indians on the Missouri, and they were both kept under orders at their respective Head Quarters, awaiting the issue of the military operations which were performed during the summer and autumn. They are now engaged in making the contemplated change of commands, but will not have time to comply with the regulation on the subject of Inspections before the close of the year.

Colonel Wool has performed a course of Inspections, extending from Fort M'Henry, Baltimore, by the way of the North River and the Lakes, to Green Bay and St. Mary's, and embracing the intermediate positions. His first inspection was made on the 26th of April, and the last, included in his report, during the month of October. He is now on a short tour to the New England States.

Colonel Archer commenced his tour of Inspection on the third of April, at Norfolk, Virginia, and has inspected the Posts on the At-

lantic coast, from East Florida to the State of Maine. Since my report of November last, he has also performed a rigid inspection of the National Armory and works of construction at Harper's Ferry. He is now engaged in a tour of inspection to the extreme Southern posts.

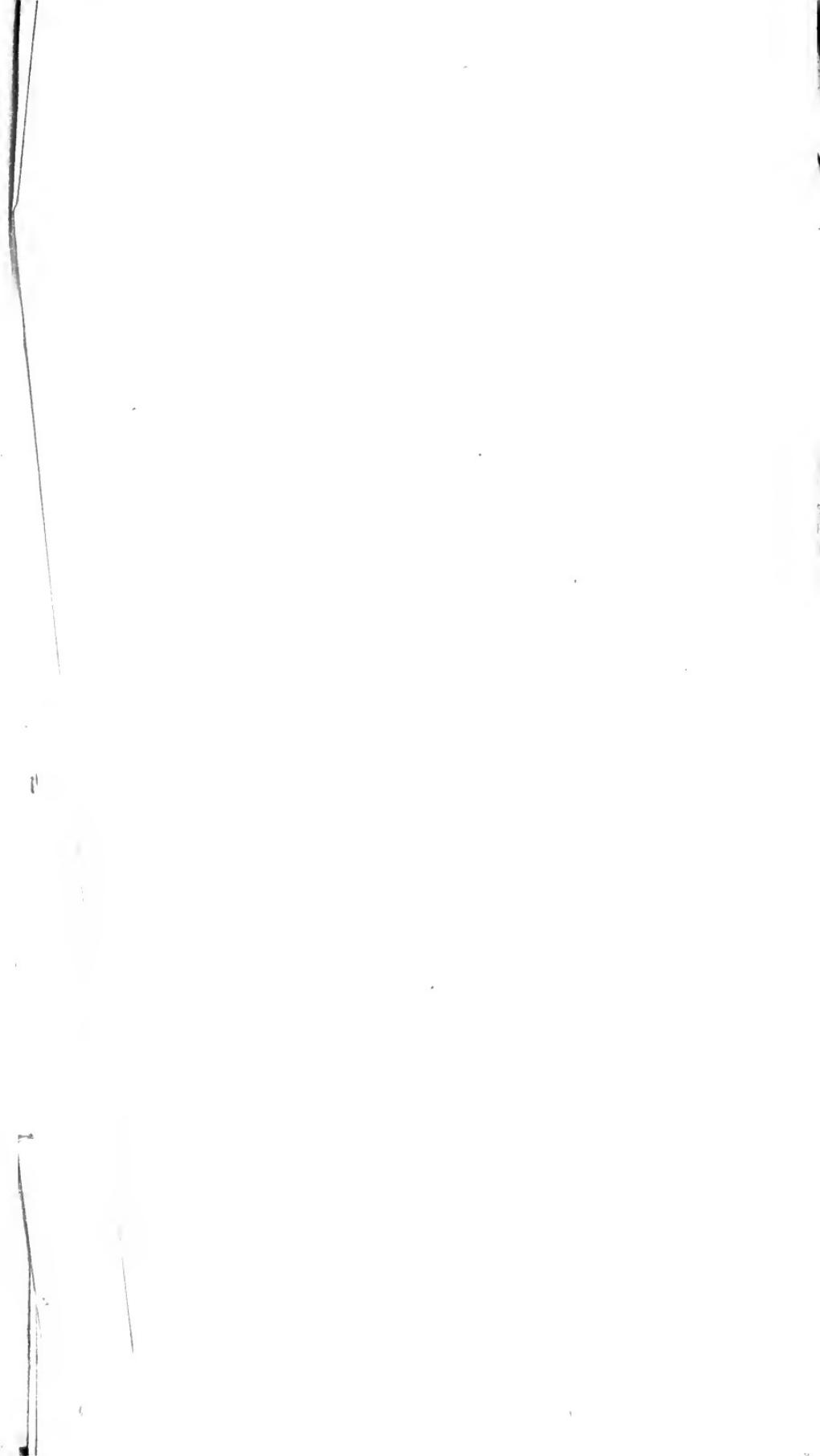
As far as my information extends, the commanding officers of the artillery regiments have regularly performed the duties of inspection required of them. Their official returns are not yet due, and I have consequently no certain basis for a report in relation to the execution of this part of their duty.

The Inspectors speak favorably of the condition of the army in all that relates to its discipline, instruction, service, and administration; and it affords me pleasure to state, from their observations, as well as my own, that there is a progressive amelioration, throughout the different departments of the army, in every thing connected with its military character.

I have the honor to be, most respectfully, sir, your obedient servant,

JAC. BROWN.

Hon. J. C. CALHOUN,
Secretary of War.



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I have the honor to be, most respectfully, sir, your obedient servant,

JAC. BROWN.

Hon. J. C. CALHOUN,
Secretary of War.

ORGANIZATION of the Army of the United States, according to the Act of 2d March, 1821.

ADJUTANT GENERAL'S OFFICE.

Washington, November 20, 1823.

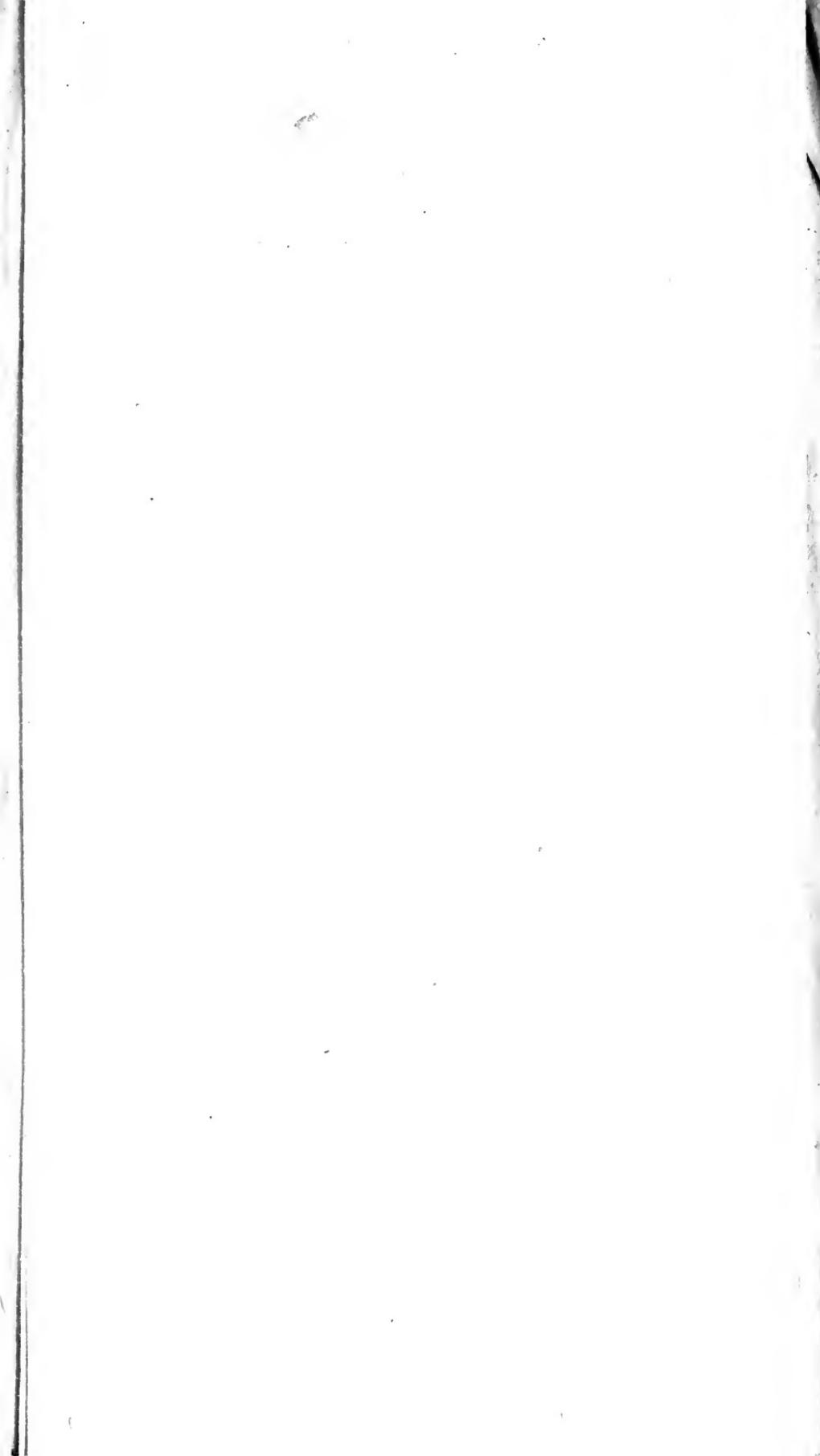
CHARLES J. NOURSE,
Adjutant General, Acting

HEAD QUARTERS.

Washington, November 20, 1823.

JACOB BROWN.





8

General Return of the Army of the United States, taken from the latest returns on file in the Adjutant General's Office.

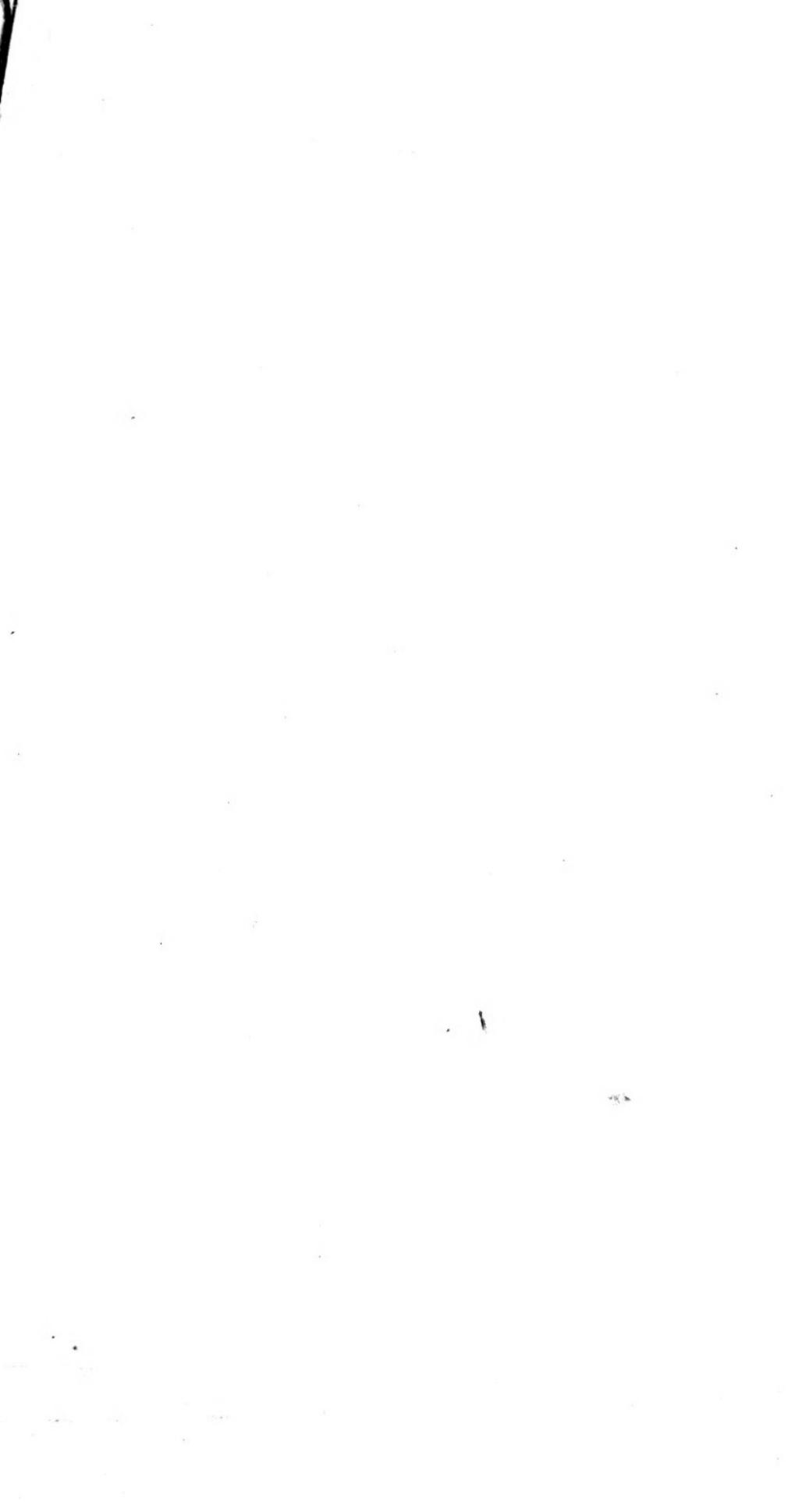
HEAD QUARTERS, WASHINGTON, November 20, 1823.

JAC. BROWN.

Adjutant General's Office, Washington, 20th Nov. 1823.

CHARLES J. NOURSE, *Adj. Gen. Acting.*





C.

DISTRIBUTION of the Troops in the Eastern Department, under the command of Brevet Major-General Winfield Scott, shewing their strength by Posts and Garrisons; taken from the latest returns on file in this office.

POSTS.	SITUATION.	COMMANDANTS.	TROOPS.	COMMISSIONED OFFICERS AND STAFF.	NON-COMMISSIONED OFFICERS, MUSICIANS, AND PRIVATES.	AGGREGATE.
Fort Sullivan	Eastport, Maine	Lieutenant Dimick	1 company 1st regiment artillery	5	54	59
Fort Preble	Portland, Maine	Major Brooks	1 company 1st artillery	5	55	60
Fort Constitution	Portsmouth, New-Hampshire	Captain F. Whiting	1 company 1st artillery	5	43	50
Fort Independence	Boston, Massachusetts	Colonel House	2 companies 1st artillery	10	102	112
Fort Wooloff	Newport, Rhode Island	Major Crane	1 company 1st artillery	5	45	50
Fort Trumbull	New London, Connecticut	Captain Baker	1 company 1st artillery	5	47	52
New York Harbor	New York	Major Fanning	1 company 1st and 2d, of 2d artillery	18	121	139
Fort Le Payette	New York Harbor	Captain Churchill	1 company 1st artillery	5	37	42
West Point	New York	Lieutenant Colonel Thayer	1 company 2d artillery	5	54	59
Watervliet Arsenal	New York	Major Daliba	1 company 2d artillery	5	48	53
Pittsburgh Arsenal	New York	Captain Gates	1 company 2d artillery	5	55	60
Pittsburgh	New York	Captain Heileman	1 company 2d artillery	3	37	40
Fort Niagara	New York	Captain Roach	1 company 2d artillery	6	49	55
Fort M'Collin	Near Philadelphia, Pennsylvania	Lieutenant Drane	1 company 2d artillery	5	51	56
Pittsburgh Arsenal	Pennsylvania	Major Bolton	1 company 2d artillery	4	47	51
Fort M'Henry	Baltimore, Maryland	Major Whistler	1 company 3d infantry	5	53	58
McKinnae	Michigan Territory	Colonel Hindman	Field and staff	3	1	4
Frankford Arsenal	Pennsylvania	Lieutenant Colonel Jones	1 company 3d artillery	5	38	43
Fort Severn	Annapolis, Maryland	Colonel Armistead	1 company 3d artillery	8	48	56
Fort Washington	On Potomac, Maryland	Captain Welch	1 company 3d artillery	4	58	62
Bellona Arsenal	Near Richmond, Virginia	Lieutenant Colonel Lindsay	1 company 3d artillery	5	44	49
Norfolk Harbor	Virginia	Lieutenant Colonel Grahut	1 company 3d artillery	4	48	52
Fortress Monroe	Hampton Roads, Virginia	Captain Spotts	1 company 3d artillery	5	64	69
Fort Johnson	Smithville, North Carolina	Major Bankhead	2 companies, 3d and 1st, of 4th art.	11	104	118
Charleston Harbor	South Carolina	Captain Mackay	1 company 3d artillery	5	55	60
Augusta Arsenal	Georgia	Lieutenant Monroe	1 company 4th artillery	5	52	57
Fort Jackson	Savannah, Georgia	Captain Erving	2 companies 4th artillery	14	96	110
St. Augustine	East Florida	General Brady	5 companies 2d infantry	16	174	190
Sackett's Harbor	New York	Major Cutler	6 companies 2d infantry	15	922	937
Sault de St. Marie	North West Territory	Major Baker	2 companies 3d infantry	6	88	94
Sagamore	Michigan Territory	Colonel Pinkney	7 companies 3d infantry	25	198	223
Green Bay				250	2,190	2,420

ADJUTANT GENERAL'S OFFICE,

Washington, 27th November, 1823.

CHARLES J. NOURSE, Adjutant General, Acting.

HEAD QUARTERS,

Washington, 20th November, 1823.

JACOB BROWN.

~~ASSISTANT~~ GENERAL'S OFFICE,

Washington, November 20, 1823.

C_H. J. NOURSE, Adj. Gen. Acting,



D.

DISTRIBUTION of the Troops in the Western Department, under the command of Brevet Major General Edmund P. Gaines, showing their strength by posts and garrisons, taken from the latest returns on file in this Office.

POSTS.	SITUATIONS.	COMMANDANTS.	TROOPS.	COMMISSIONED OFFICERS AND STAFF.	NON-COMMISSIONED OFFICERS, MUSICIANS, AND PRIVATE.	AGGREGATE.
St. Marks	East Florida	Captain M'Clintock	One company fourth artillery	5	42	47
Barrancas	Pensacola, W. F.	Colonel Fenwick	Three companies fourth artillery	16	140	156
Fort St. Philip	New Orleans, La.	Major Humphrey	One company fourth artillery	5	31	36
Baton Rouge	Louisiana	Lieutenant Colonel Taylor	Three companies first infantry	7	134	141
Natchez	Missouri	Captain Powell	One company first infantry	1	31	35
Belle Fontaine	On the Missouri	Colonel Chambers	Six companies first infantry	21	305	526
Cantonment Clinch	Near Pensacola, W. F.	Lieutenant Colonel Brooke	Fourth regiment of infantry	34	289	323
St. Anthony	Upper Mississippi	Colonel Sodling	Six companies fifth infantry	21	930	251
Fort Crawford	On the Mississippi	Lieutenant Colonel Morgan	Two companies fifth infantry	6	89	95
Fort Edwards	On the Mississippi	Major Marston	One company fifth infantry	3	40	43
Fort Armstrong	On the Mississippi	Major Vose	One company fifth infantry	3	44	47
Cantonment Taylor	Louisiana	Captain Berryman	One company seventh infantry	3	48	51
Cantonment Jesup	Louisiana	Lieutenant Colonel Many	Four companies seventh infantry	10	189	199
Fort Smith	On the Arkansas	Colonel Arhuckle	Five companies seventh infantry	17	201	213
Council Bluffs	Missouri	Lieutenant Colonel Leavenworth	Sixth regiment of infantry	22	357	579
				174	2,173	2,347

ADJUTANT GENERAL'S OFFICE,

Washington, 20th November, 1823.

CHAS. J. NOURSE,

Adjutant General, Acting

HEAD QUARTERS,

Washington, 20th Nov. 1823.

JAC. BROWN



E.

A STATEMENT shewing the whole number of recruits enlisted in the Army from the 1st of January, 1823, to 1st Oct. 1823.

1st Regiment of Artillery	-	-	-	142
2d Regiment of Artillery	-	-	-	125
3d Regiment of Artillery	-	-	-	86
4th Regiment of Artillery	-	-	-	29
1st Regiment of Infantry	-	-	-	245
2d Regiment of Infantry	-	-	-	89
3d Regiment of Infantry	-	-	-	18
4th Regiment of Infantry	-	-	-	6
5th Regiment of Infantry	-	-	-	44
6th Regiment of Infantry	-	-	-	38
7th Regiment of Infantry	-	-	-	6
				—
				828

Enlistments made at the principal rendezvous since the 1st January, 1823.

Boston, Massachusetts	-	-	-	239
Providence, Rhode Island	-	-	-	27
New York City	-	-	-	351
Albany, New York	-	-	-	170
Philadelphia, Pennsylvania	-	-	-	190
Baltimore, Maryland	-	-	-	103
				—
				1,908

Amount of money advanced since the 1st of January, 1823,
to officers on account of the recruiting service - \$24,070
Amount of recruiting accounts which have been rendered
for settlement since the 1st of January, 1823, - 16,416 11

HEAD QUARTERS, Washington, Nov. 20, 1823.

JACOB BROWN.

ADJUTANT GENERAL'S OFFICE,

Washington, November 20, 1823.

CH. J. NOURSE, Adj. Gen. Acting,

B.

Report of the Quartermaster-General, with accompanying Statements A and B.

QUARTERMASTER GENERAL'S OFFICE,

November 22, 1823.

SIR: In compliance with your instructions, I have the honor to submit the accompanying statements A and B. The former exhibits the amount of money drawn from the Treasury, and received from other sources, by the officers of the Quartermaster's Department, during the year 1822, with the amount disbursed during that year. The latter exhibits the amount drawn and received by them, prior to the 30th of September of the present year, with the amount disbursed; so far as accounts have been received.

As this is an office, not of settlement, but of administration, it does not afford the data, on which a statement can be made, which shall be strictly correct in all its details. Those can be furnished only at the office where accounts are finally adjusted; but it is believed, the statements submitted are so near the truth, that the only difference which shall be found between them, and the detailed accounts of the Treasury, will consist of the amount suspended or disallowed at the Treasury, during the period which they embrace. The best test of the efficiency of a department, is to be found, not in minor details, but in general results; and if we compare the expenditures of the present year, with those for the same objects in corresponding periods of preceding years, the result will be found much in favor of the present—though, during the year, nearly two regiments have been cantoned, and many changes have been made in the stations of troops: besides, an expedition has been carried on against the Indians of the Missouri, in which the troops engaged moved upwards of fifteen hundred miles, and the sustaining corps more than a thousand.

On the subject of accountability, I think I am warranted in saying, that as much perfection has been attained as possible, without further legislative provision; and I feel confident that every cent placed at the disposal of the officers of the Department, during the whole period embraced by the statements A and B, either has been disbursed, or is actually in their hands, applicable to the public service, and will be accounted for during the year.

I feel it to be my duty, before closing my report, to point out briefly, some of the defects in the organization of the Department, and to suggest such changes as experience has shewn to be necessary.

In 1820, when the military frontier was not so extensive as at present, there were attached to the Department, in addition to the Quartermaster General and two deputies, sixteen assistants, besides eighteen regimental and battalion quartermasters. The act of Con-

gress of March 1821, reorganizing the army, abolished the regimental and battalion quartermasters, and reduced the number of assistants from sixteen to ten; so that of thirty-seven officers, thirteen only were retained. The same act reduced the purchasing department to one Commissary General and two Storekeepers; and the duties relative to the administration and accountability of army clothing, were necessarily transferred to the Quartermaster's Department; thus nearly doubling its labors and responsibility, though its force had been reduced nearly two-thirds. The law, it is true, authorized the employment of Subsistence Commissaries in the Quartermaster's Department; but they have the duties of their own Department to perform; which, at stations where their services are most necessary, give them sufficient employment. Besides, the experience of every Department proves, that the only way to ensure strict accountability, is, to confine officers to the duties of their own branches of service—to compel them to perform them, and positively to prohibit their interference with those of others. The reduction of the rank and file of the Army from ten to six thousand men, by no means warranted a corresponding reduction in the disbursing departments; for it is well known to every intelligent military man, that the labors of most branches of the Staff, and particularly of the Quartermaster's Department, depend, not on the number of troops in service, but on the number and remoteness of the posts occupied, the extent of the frontiers, and the dispersed state of the military resources of the nation.

The officers at present attached to the Department, are entirely inadequate to the proper and efficient discharge of the duties required of them, and the compensation of the assistants, on whom necessarily devolves most of the laborious details of the Department, does not bear a just proportion to their duties and responsibility.

The officers of that grade now in the Department, are equal in capacity and intelligence to those of any other grade or corps in the army; but I fear that, unless measures be adopted to render their situation more desirable, they will, for the most part, abandon their stations and return to their companies. They should be allowed a compensation, which would not only afford them a competent support, but be an equivalent for the talents and labor required in the discharge of their duties. But, it may be said, let those who are dissatisfied, retire—there are others who would gladly fill their places—true, there are—and if the importance of a station depended upon the number of applicants to fill it, and the merit of those applicants upon the clamorous assertion of their pretensions, this might be good reasoning—but every day's experience proves, that the number of applicants does not depend upon the value of the station sought:—reduce the compensation one half, and they would not be diminished. The difference would then consist in the character, and not in the number;—for even if an office be set up to the *lowest* bidder, there will always be bidders enough.

I would, therefore, propose, that in addition to the officers now attached to the Department, there be authorized three quartermas-

ters, and eight assistants, to be taken from the line of the army. This change, with an allowance of forage to the assistants by presenting sufficient inducements to men of character to enter, and remain in the Department, would better secure a strict accountability, than all the restrictive laws on the statute book. It is called for by every consideration of policy as well as economy; for the best guarantee the nation can have, for the proper application of its funds, will be found in the honor, intelligence, and abilities, of its officers. Let it not be said, that the system of bonding affords this guarantee. Experience proves the contrary. It may secure the payment of duties at the Custom House, or afford ultimate security against defaulters, but can never insure good faith in the public expenditures.

I have the honor to be, sir, very respectfully, your most obedient servant.

TH. S. JESUP.

Brig. Gen. and Quar. Mas. Gen. of the Army.

To the Hon. J. C. CALHOUN.

Secretary of War.



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To the Hon. J. C. CALHOUN.

Secretary of War.

A.

STATEMENT showing the amount of Funds remitted to Officers of the Quartermaster's Department, in the year 1822, and the amount for which accounts were rendered for that year.

Amount remitted in the first quarter of the year,	-	-	-	-	-	-	-	-	-	-	-	\$56,655
Do. do. second quarter,	-	-	-	-	-	-	-	-	-	-	-	148,418
Do. do. third quarter,	-	-	-	-	-	-	-	-	-	-	-	81,834
Do. do. fourth quarter,	-	-	-	-	-	-	-	-	-	-	-	79,608
												<hr/> 366,015
Amount received by officers from the sales of public property authorized during the year,	-	-	-	-	-	-	-	-	-	-	-	<hr/> 9,168
												<hr/> <hr/> \$375,183
Amount disbursed per accounts rendered for the first quarter,	-	-	-	-	-	-	-	-	-	-	-	60,683
Do. do. do. second quarter,	-	-	-	-	-	-	-	-	-	-	-	117,426
Do. do. do. third quarter,	-	-	-	-	-	-	-	-	-	-	-	77,838
Do. do. do. fourth quarter,	-	-	-	-	-	-	-	-	-	-	-	92,542
												<hr/> 348,489
Excess of remittances, &c. beyond the actual disbursements of the year,	-	-	-	-	-	-	-	-	-	-	-	<hr/> <hr/> \$ 26,694

NOTE. In consequence of the short appropriation for 1821, there were no funds of consequence in the hands of officers at the close of that year to be taken into view in this statement. The above excess was in the hands of the officers of the Department at the expiration of the year 1822, and was carried to the service of the year 1823. The public property noticed above as sold, consisted of various small articles of supplies which had become damaged from unavoidable accidents or of no further use.





Statement shewing the amount of funds remitted to the Officers of the Quarter-Master's Department in the first three quarters of the year 1823, and the amount for which accounts have been rendered for the same period.

Amount in the hands of the several Officers, from the year 1822,	- - - - -	\$26,694 00
Amount remitted in the first quarter of 1823,	- - - - -	52,570 00
" " second quarter	- - - - -	71,450 00
" " third quarter	- - - - -	98,648 00
Amount received by Officers from the sales of public property, authorized during the period embraced above,	- - - - -	2,122 00
Amount disbursed, per accounts rendered for the first quarter,	- - - - -	61,617 02
" " " second quarter,	- - - - -	89,161 93
" " " third quarter,	- - - - -	79,112 36
Excess of remittances,.....		\$21,593

Note....The above excess is made up of small unexpended balances in the accounts of the several Officers at the close of the third quarter, which have been carried to the service of the succeeding quarter. The amount was, on the 30th September, chiefly deposited in the various Banks designated for the reception of public funds. The residue was in the hands of Officers stationed remote from those institutions.

C.

*Report of the Commissary General of Subsistence, with Statements
A. and B.*

OFFICE OF THE COMMISSARY GENERAL OF SUBSISTENCE,
Washington, Nov. 22, 1823.

SIR: In obedience to your orders of the 7th April last, and 5th inst. I have the honor of presenting to your view two statements; the one marked A, exhibiting the expenditures in this Department for the entire year 1822, and that marked B, shewing the disbursements in the three first quarters of 1823.

The whole amount remitted and charged in the year 1822, is \$284,764 11; the amount disbursed and accounted for, \$270,850 46; leaving a balance of \$13,913 65, from which the following sums are to be deducted, viz: \$73 83 in the hands of the Assistant Commissary at Fort Osage, received by him in paper of the Edwardsville Bank; \$6,500 remitted to the Assistant Commissary at New Orleans, on the 28th of December, 1822, only three days previous to the expiration of the year, and intended to meet the expenditures of the 1st quarter of 1823; \$861 69, the amount of provisions actually purchased and issued to the troops; but, for which purchase, the vouchers have been lost on their route to this place.

These three sums, collectively, deducted from \$13,913 65, will leave a balance of \$6,478 13, to be accounted for in the first quarter of 1823; and the whole of which, including the \$6,500 remitted to the Assistant Commissary at New Orleans, on the 28th of December, 1822, has been accounted for in the first quarter of the present year.

The whole amount remitted and charged in the three first quarters of 1823, is \$276,519 70; the amount disbursed and settled, \$254,278 93, leaving a balance of \$22,240 77.

It may not be improper for me to remark, that, owing to the great distance which the military stations on the Upper Lakes, Upper Mississippi, and Red River, are from any post route, that the accounts for the 3d quarter of the year have not yet been received from those posts; it is, however, justly due to the Assistant Commissaries and Agents of the Department, to state, that their accounts and returns are promptly and regularly rendered; and that of the moneys charged and disbursed in 1822, the loss of one cent has not accrued to the United States; and there is every reason to believe, that the same will be the result of the disbursements for 1823.

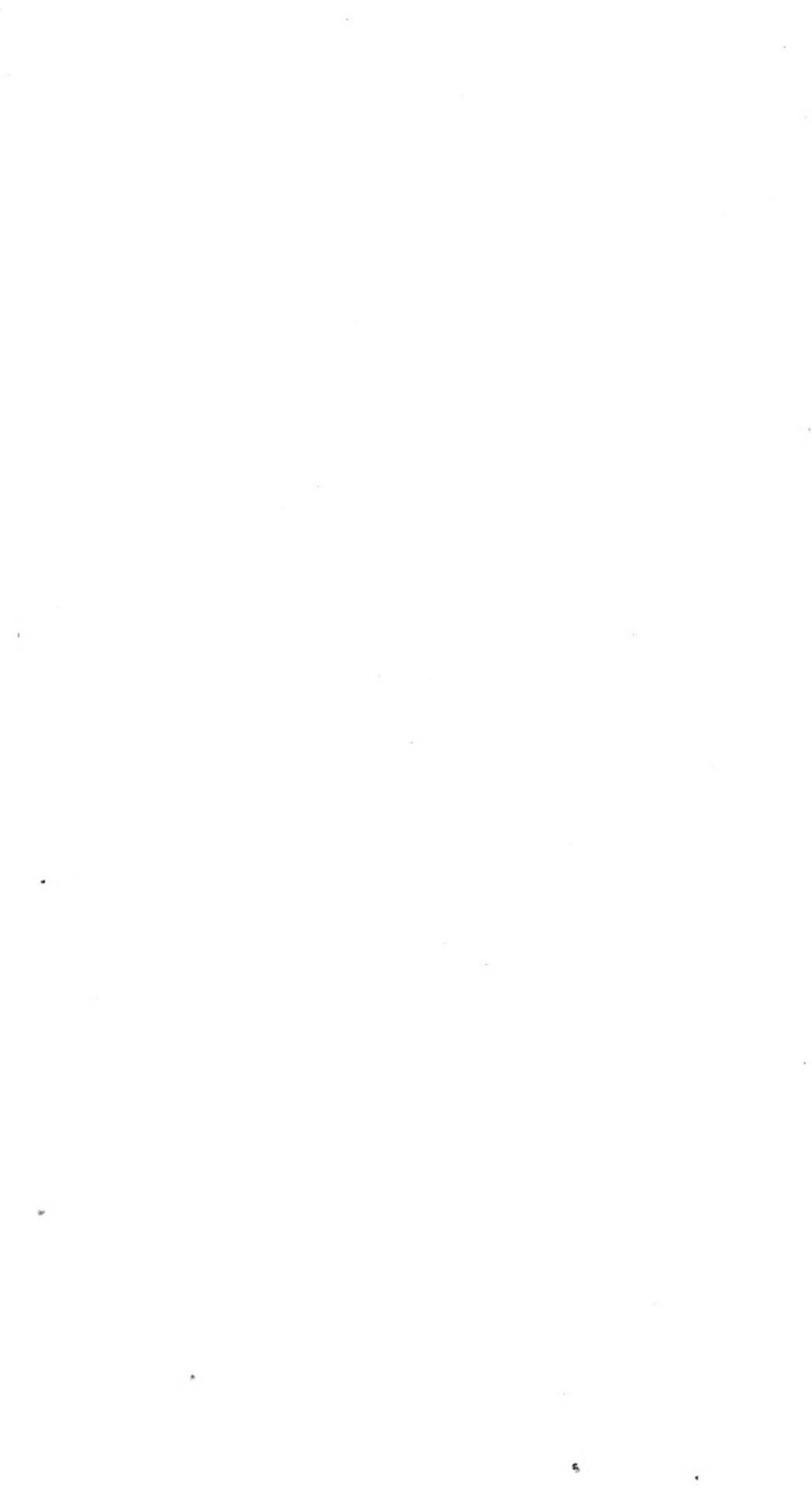
Very respectfully, your most obedient servant,

GEORGE GIBSON,

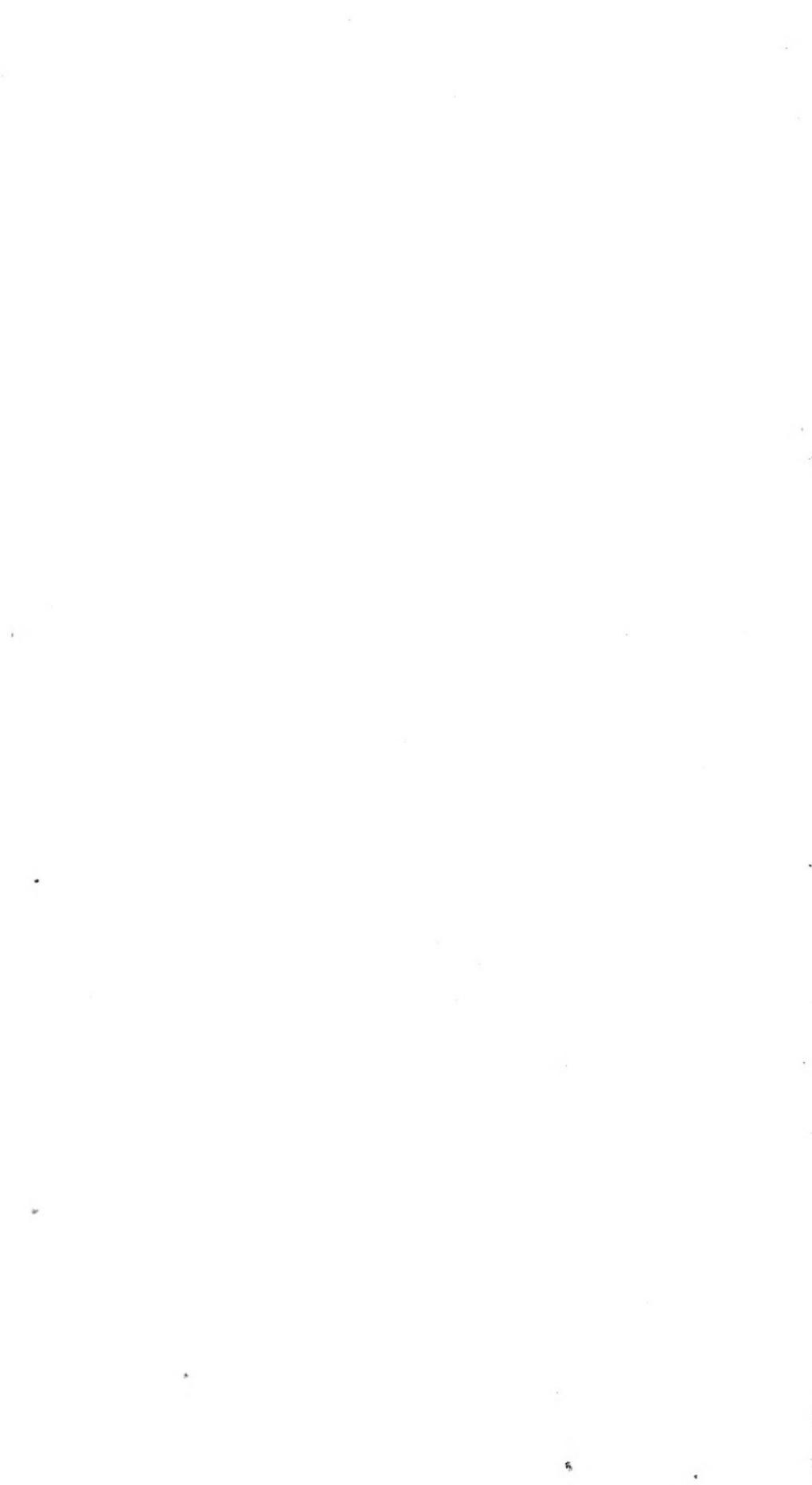
Commissary General of Subsistence.

The Hon. J. C. CALHOUN,

Secretary of War.







A.

STATEMENT exhibiting the Moneys remitted to Contractors in 1822, and the amounts accounted for by them; the Moneys remitted to the Assistant and Acting Assistant Commissaries of Subsistence, for the same period; the charges against them for sales of provisions at auction to officers on the frontier Posts, or otherwise, including the outstanding balances 31st December, 1821, and the amount accounted for by them in 1822.

NAMES.	REMITTED.	CHARGED ON ACCOUNT OF SALES OR OTHERWISE.	TOTAL CHARGED.	ACCOUNTED FOR.	REMARKS.
William Hill and Brothers, Contractors	\$ 7,837 90	\$ 1,846 78	\$ 9,684 68	\$ 9,674 84	
Cave Johnson	do -	11,553 10	2,410 14	13,943 24	13,943 24
Jesse Smith	do -	8,168 19	-	8,168 19	8,168 19
Henry J. Hunt	do -	14,089 16	-	14,089 16	14,089 16
Worthington, Waddle & Davidson	do -	5,074 68	-	5,074 68	5,074 68
Martin Andrews	do -	6,123 81	-	6,123 81	6,123 81
Adam G. Goodlett	do -	4,460 85	-	4,460 85	4,460 85
Samuel Bell	do -	640 37	-	640 37	640 37
Robert Mc'Coy	do -	465 81	-	465 81	465 81
Timothy Winn	do -	6,353 12	-	6,353 12	6,353 12
Robert H. Gilman & Co.	do -	6,119 86	8 79	6,118 05	6,118 05
Nathaniel W. Strong	do -	2,196 76	-	2,196 76	2,196 76
Thomas McKnight	do -	8,001 97	-	8,001 97	8,001 97
Abraham Edwards	do -	568 00	-	568 00	568 00
Robert S. Barr & Co.	do -	29,010 88	-	29,010 88	29,010 88
Ezra Meach	do -	1,465 27	-	1,465 27	1,465 27
Napier & Wilbur	do -	6,670 91	-	6,670 91	6,670 91
John A. Daniel Binsdale	do -	2,839 68	-	2,839 68	2,839 68
John Napier	do -	8,887 75	-	8,887 75	8,887 75
Lieut. Wm. D. Mc'Ray, acting assistant commissary of subsistence	-	659 29	-	659 29	659 46
Zalmon C. Palmer, assistant commissary of subsistence	-	-	2,825 58	2,825 52	2,990 27
Andrew Lewis	do -	-	2,166 13	2,166 13	1,569 91
Captain Alexander R. Thompson	do -	-	6 43	6 43	6 43
Lieut. John C. Kirk	do -	1,989 28	2,260 98	4,250 26	Closed
John A. Webber	do -	1,050 00	217 11	1,267 11	Do
Charles D. Espenville, actg'do	-	451 55	-	451 55	Disbursing
John S. Pierce acting do	-	-	201 52	201 52	Closed
Timothy Green	do -	635 00	1 10	636 10	Do
Martin Thomas, Jr. acting do	-	650 00	77 76	327 76	Disbursing
Elijah Lyon	do -	707 31	536 41	1,243 72	Closed
John B. F. Russell	do -	-	649 21	649 21	Do
Walter Bicker	do -	486 36	1,411 58	1,897 94	Do
Charles Burbridge	do -	-	276 64	276 64	786 99
Henry Saunders	do -	440 00	41 45	481 45	Do
Andrew Mc'Intyre	do -	1,290 00	1,030 30	2,320 30	484 55
Charles S. Merchant	do -	765 24	566 02	1,331 26	Do
Richard Baché	do -	460 00	37 74	497 74	1,227 95
Walter Smith	do -	580 00	66 86	646 86	Do
Charles Melton	do -	2,771 12	77 59	2,848 71	646 46
Jacob Schumuck	acting do	110 00	681 06	791 06	2,715 05
M. A. Patrie &	do -	525 00	73 55	598 55	Closed
Allen Lovd	do -	2,415 00	141 87	2,556 87	Disbursing
Richard Delafield	acting do	2,927 50	309 44	2,336 94	2,567 37
James Simonson	acting do	645 00	-	643 00	Do
James Young	do -	1,960 00	282 25	2,212 25	2,210 02
Peter Melendy	do -	7,805 91	1,297 80	9,103 71	Closed
G. Powell	acting do	1,200 00	40 85	1,240 85	Disbursing
Lieut. Col. James B. Many	acting do	-	500 00	500 00	Closed
Captain John Rogers, military storekeeper	-	934 22	381 00	1,315 22	Do
Lieut. Col. Z. Taylor	-	1,700 00	-	1,700 00	1,700 00
General E. P. Gaines	-	-	450 00	450 00	Do
Lieut. Martin Scott, acting assistant commissary of subsistence	-	-	109 70	109 70	Do

{ The balance \$ 73 83, is in paper of the Edwardsville Bank, which
he is ready to refund.



ENT----Contin

ACCOUNT OTHER	TOTAL CHARGE
3 12	1,043 12
2 34	8,672 52
2 40	152 40
7 03	7 03
2 60	192 60
4 86	5,134 86
1 66	666 66
2 40	5
7 83	4,1



STATEMENT----Continued.

NAMES.	REMITTED.	CHARGED ON ACCOUNT OF SALES OR THEM- WISE.	TOTAL CHARGED.	ACCOUNTED FOR.	REMARKS.
Lieut. D. Wilcox, acting assistant commissary of subsistence	-	1,043 12	1,043 12	1,043 12	Closed
Wm. S. Colquhoun, assistant commissary of subsistence	8,070 18	602 34	8,672 52	8,672 52	Do
William R. Journe acting do	-	152 40	152 40	152 40	Do
Major William Hopkins acting do	-	7 03	7 03	7 03	Do
Lieut. P. Andrews acting do	-	192 60	192 60	191 62	Do
Isaac Clark	-	5,134 86	5,134 86	5,134 86	Closed
Thomas W. Lendrum do	645 00	21 66	666 66	666 08	Disbursing
Captain H. Bradley acting do	-	332 40	332 40	115 98	Do
Lieut. Arthur W. Thornton do	5,440 00	677 83	4,117 83	4,490 15	Do
Major William Bradford acting do	115 28	132 48	847 76	847 76	Closed
Captain Samuel Spotts acting do	-	182 41	182 41	182 41	Do
Lieut. L. A. Rigal do	976 08	922 02	1,198 10	1,198 10	Do
N. G. Dana do	472 00	307 80	679 80	575 80	Disbursing
Jacob Brown do	16,555 84	291 37	16,847 21	18,116 86	Do
James A. Chambers	-	510 83	510 83	125 90	Do
Joseph P. Taylor do	970 00	208 39	1,178 39	1,159 58	Do
Thomas Barker do	3,100 00	2,838 50	5,938 50	4,685 44	Do
George W. Gardiner do	1,815 59	8 85	1,824 44	1,693 39	Do
William L. McLintock do	15,692 46	1,284 87	16,967 33	10,031 55	Do \$6,500, remitted Dec. 28, 1822, to meet expenses of 1st qr. 1823
Hugh K. Meade do	100 00	635 90	735 90	699 39	Do
John B. Clark do	500 00	871 45	1,371 45	1,371 45	Closed
Thomas J. Baird do	610 00	67 92	677 92	665 31	Disbursing
Upton S. Fraser do	770 00	401 18	1,171 18	1,122 92	Do
John Monroe do	200 00	237 10	437 10	471 60	Do
Horatio N. Baker do	-	1,131 13	1,131 13	1,131 13	Closed
William Wells do	693 00	-	625 00	585 39	Disbursing
Thomas Childs do	1,205 00	50 00	1,255 00	1,198 26	Do
E. J. Lambert acting do	250 00	406 31	655 31	655 31	Closed
P. Morrison acting do	-	34 06	34 06	34 06	Do
Nathan Clark do	-	1,001 67	1,001 67	1,032 33	Disbursing
H. J. Felts acting do	-	115 22	113 22	113 22	Closed
Captain James R. Stubbs acting do	-	343 37	343 37	33 37	Do
Lieut. John Philbrick do	1,000 00	1,889 16	2,889 16	724 66	Disbursing—\$ 861 69 of the moneys remitted have been furnished in provisions, but vouchers not received.
H. W. Fitzlough do	-	2,020 00	375 70	2,637 07	Disbursing
Captain James H. Hook acting do	14,270 46	-	14,270 46	14,270 46	Closed
Lieut. James R. Blaney acting do	-	669 24	680 34	680 34	Do
George C. Butter acting do	-	675 85	2,625 85	1,092 49	Disbursing
Captain James Green acting do	-	82 63	82 63	31 10	Do
Lieut. Harvey Brown do	550 00	918 91	1,562 91	1,273 91	Do
John L'Engle do	610 00	946 81	636 81	830 35	Do
Otis Wheeler acting do	277 20	129 64	406 84	313 78	Do
B. L. E. Bonneville do	-	830 00	850 00	496 71	Do
	\$ 258,924 03	\$ 45,840 08	\$ 284,764 11	\$ 270,850 46	

RECAPITULATION.

Total amount charged - - - - - \$ 284,764 11
 Total amount expended - - - - - 270,850 46

Balance in the hands of the assistant and acting assistant Commissaries of Subsistence, 31st December, 1822 - - - - - \$ 13,913 65

OFFICE OF THE COMMISSARY GENERAL OF SUBSISTENCE,

Washington, November 22, 1823.

GEORGE GIBSON,
 Com. Gen. of Subsistence.

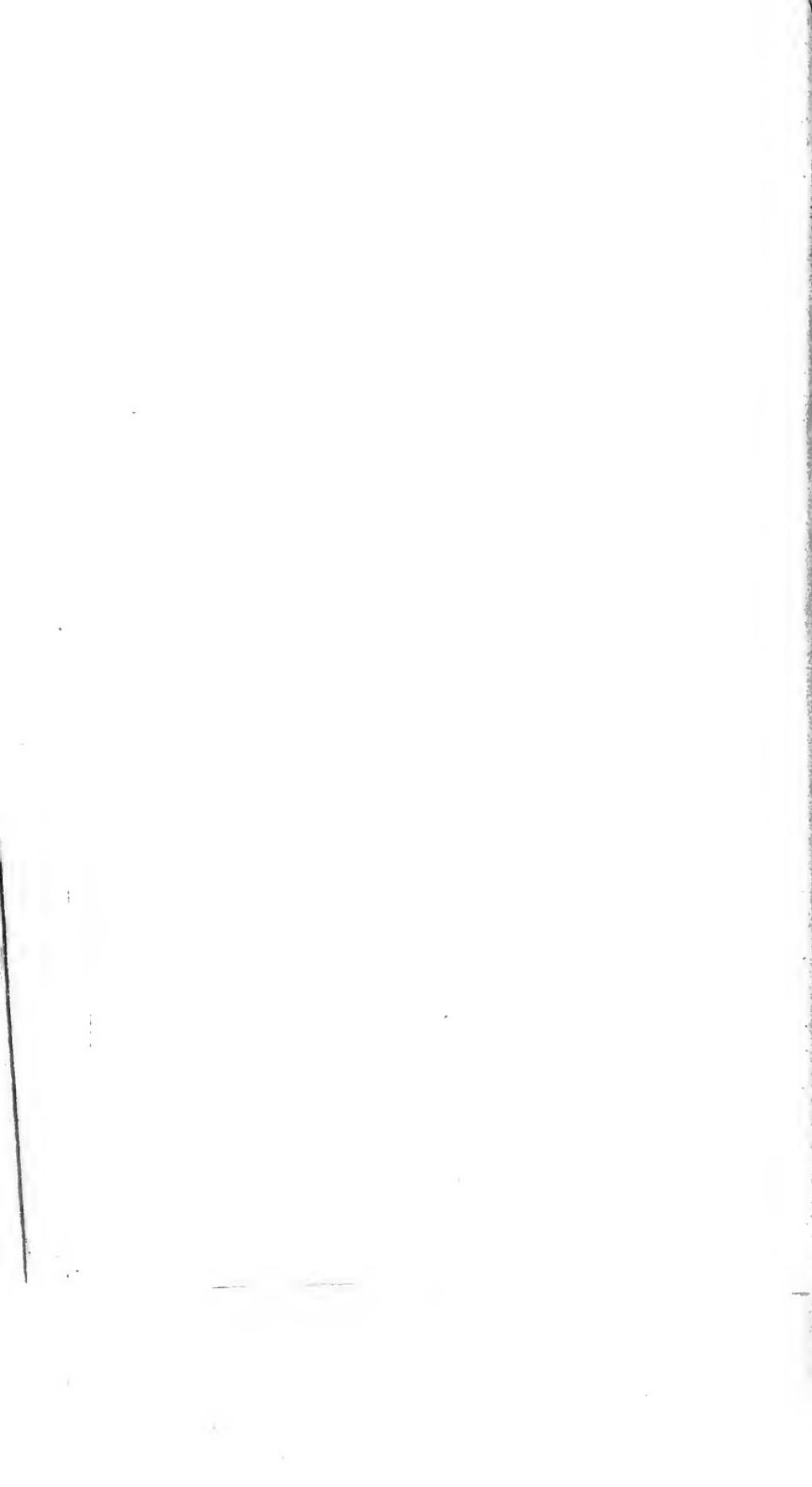




Statement, Exhibiting the Moneys remitted to Contractors, from the 1st of January to the 30th September, 1823, and the amounts accounted for by them; the Moneys remitted to the Assistant and Acting Assistant Commissaries of Subsistence, for the same period; the Charges against them for Sales of Provisions at Auction, to Officers on the Frontiers, or otherwise, including the outstanding balances 31st December, 1822; and the Amount accounted for by them, in the 1st, 2d, and 3d quarters of 1823.

NAMES.	AMOUNT REMITTED.	AMOUNT CHARGED ON ACCOUNT OF SALES, &c.	TOTAL AMOUNT CHARGED.	TOTAL AMOUNT ACCOUNTED FOR.	REMARKS.
Cave Johnson, Contractor	\$1,946 84	\$2,956 64	\$4,903 48	\$4,903 48	
Jesse Smith do	2,516 95	-	2,516 95	2,516 95	
Henry J. Hunt do	2,292 17	-	2,292 17	2,292 17	
Martin Andrews do	4,077 29	-	4,077 29	4,077 29	
Silas Butler do	1,232 36	-	1,232 36	1,232 36	
Adam G. Goodlett do	2,593 49	232 42	2,825 91	3,275 91	
Lathrop A. G. B. Grant do	473 99	-	473 99	473 99	
Robert McCay do	1,389 02	5 43	1,399 45	1,392 45	
Pitlo L. Mills do	5,477 64	60 00	5,507 64	5,507 64	
Robert H. Gilman & Co. do	4,012 77	-	4,912 77	4,912 77	
Robert S. Barr & Co. do	4,852 53	-	4,852 53	4,852 53	
Ezra Meech do	1,389 38	-	1,389 38	1,389 38	
Napier and Wilbur do	5,469 15	114 69	5,582 94	5,582 84	
Robert J. Ward do	15,625 80	-	15,625 80	15,625 80	
Carey Selden do	11,987 31	-	11,928 31	11,928 31	
William and John James do	5,269 55	-	5,269 55	5,269 55	
Herman A. Fay do	585 60	-	988 00	988 00	
Commodore D. Williams do	6,138 01	-	6,138 61	6,138 61	
Vernall and Williams do	4,155 93	-	4,515 95	4,515 95	
Stewart Ramsey do	3,219 00	-	3,219 00	3,219 00	
R. and J. Pogue do	10,651 51	-	10,651 51	10,651 51	
Vernall and Pemberton do	15,598 44	-	15,598 44	15,598 44	
Liaman Farwell do	1,297 54	-	1,297 54	1,297 54	
Thomas Worthington do	3,410 42	-	3,410 42	3,410 42	
John M. Curdy do	6,522 64	-	6,522 64	6,522 64	
Giles Sanford do	11,179 49	-	11,179 49	11,179 49	
Balance in the hands of the assistant and acting assistant commissaries of subsistence, on the 31st December, 1822.	-	13,939 65	13,939 65	13,939 65	
Lieut. Zalmon C. Palmer, assistant commissary of subsistence	1,323 42	1,477 45	2,800 87	2,815 94	Disbursing
Andrew Lewis do	-	1,052 89	1,052 59	59 21	Do
Capt. H. Bradley, acting do	675 00	847 52	1,093 52	422 52	Do
Lieut. J. A. Welsh do	850 00	23 53	873 53	1,070 95	Do
Timothy Green do	530 00	14 59	544 39	515 97	Do
Martin Thomas, jr. acting do	455 00	108 47	563 47	518 75	Do
Charles S. Merchant do	535 24	131 07	466 31	446 58	Do
Richard Delafield, acting do	2,655 00	271 99	2,926 99	2,679 35	Do
Giles Porter do	7,702 25	39 69	7,741 92	7,741 92	Closed
William R. Jouett do	-	5 87	5 87	5 87	Do
M. A. Patrick do	425 00	28 22	453 22	450 73	Disbursing
Thomas W. Lendrum do	405 00	4 58	409 58	405 15	Do
Arthur W. Thornton do	5,780 00	361 12	6,141 12	5,831 49	Do
Le. A. Riggs do	200 00	111 66	311 66	280 78	Do
James Young do	340 00	1,076 14	1,476 14	809 66	Do
Jobab Brown do	7,000 00	534 16	7,534 16	8,210 32	Do
James A. Chambers do	-	421 03	67 00	67 03	Closed
Thomas Barber do	320 00	1,030 03	4,689 95	3,58 89	Disbursing
Hugh K. Meade do	3,400 00	153 71	615 71	619 22	Do
John B. Clarke do	450 00	855 07	7,879 57	2,194 44	Do
Upton S. Fraser do	7,004 50	100 85	775 85	542 70	Do
John Monroe do	675 00	416 32	601 32	538 47	Do
E. A. Hitchcock, acting do	185 00	100 00	100 00	100 00	Closed







D.

Report of the Paymaster General.

PAYMASTER GENERAL'S OFFICE,
War Department, Nov. 20th, 1823.

SIR: In obedience to your instructions, I have the honor to report that, in the year 1822, there was drawn from the Treasury on warrants in favor of Paymasters of the army of the United States, the sum of nine hundred and eighteen thousand two hundred and seventy five dollars and seventy-four cents, the whole of which was expended in paying the troops, and has been accounted for.

I have also the honor to submit a statement of the sums received by the several Paymasters in the three first quarters of the present year, the amount unexpended and applicable to the payments of the fourth quarter, and the balance not yet accounted for.

I am confident, from the reports of the Paymasters, that, by this time, all the troops have been paid to the first of September, the officers generally and several companies to the first of November, and that the accounts will be received before the close of the year.

Respectfully, your obedient servant,

N. TOWSON,

Paymaster General.

Hon. J. C. CALHOUN, *Secretary of War.*

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to 1st November, 1823

to 1st October.

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y to 1st October, 1823

do.

panies at Sagana, from November, 1823, but the

ctober, 1823.

ster General.

STATEMENT of the amount of money drawn from the appropriation for the Pay Department, and remitted to the disbursing officers, on account of payments for the three first quarters of the year 1823; the amount unexpended and deducted from the estimates for the fourth quarter; the balance to be accounted for; and the periods to which the troops have been paid, and accounts rendered.

NAMES OF PAYMASTERS.	AMOUNT OF FUNDS REMITTED IN THE THREE FIRST QUARTERS OF THE YEAR.	AMOUNT UNEXPENDED AND DEDUCTED FROM THE ESTIMATES FOR THE 4TH QUARTER.	BALANCE REMAINING TO BE ACCOUNTED FOR.	PERIODS TO WHICH THE TROOPS HAVE BEEN PAID, AND ACCOUNTS RENDERED.								REMARKS..
				1st September, 1823	-	-	-	-	-	-	-	
David S. Townsend	\$ 48,600	None.	None.	1st September, 1823	-	-	-	-	-	-	-	Balance of \$ 1 56 due paymaster.
Satterlee Clark	43,200	None.	11,448	1st July, 1823.								Balance of \$ 440 99 due paymaster.
Thomas J. Leslie	130,100	None.	None.	1st September, 1823	-	-	-	-	-	-	-	
Charles B. Talmadge	87,000	9,154 39	None.	Do.								Resigned; since dead. His estate is solvent, and it is believed the balance will be paid without suit.
Jacob W. Albright	3,200	None.	965 58	-	-	-	-	-	-	-	-	
Timothy P. Andrews	100,000	None.	None.	1st November, 1823.								
Charles H. Smith	26,700	191 77	None.	1st September; officers generally to 1st November, 1823.								
Abraham A. Massias	26,000	150 87	None.	Do. do. to 1st October.								
Thomas Wright	53,500	None.	4,099 21	1st July, do. to 1st September.								
Daniel Randall	56,000	5,000	540 23	1st September, except one company at Sulphur Fork, Red River, which is paid to 1st July, 1823.								The amount to be accounted for is reserved for the payment of the company at Sulphur Fork.
Ashur Phillips	21,500	None.	2,703 12	1st May; officers generally to 1st September, 1823	-	-	-	-				Five companies stationed at Fort Smith, Arkansas, receive two payments in the year. Funds for the last payment are not furnished until after the expiration of the three first quarters, and the accounts are not expected before December.
Thomas Biddle	58,300	None.	None.	1st September; officers generally to 1st October, 1823.								
Alfonso Wetmore	30,000	4,490 68	None.	Do. do. do.								
David Gwynn	61,600	4,324 49	4,396 20	1st September, except two companies at Sagana, from which accounts are received to 1st May, 1823.								The paymaster reports the companies at Sagana paid to 1st November, 1823, but the accounts are not yet received.
George A. Bibby	35,000	None.	None.	1st September; officers to 1st October, 1823.								
	\$ 760,900	\$ 28,312 20	\$ 24,152 34									

PAYMASTER GENERAL'S OFFICE, WAR DEPARTMENT,

November 20, 1828.

N. TOWSON, Paymaster General.

STATEMENT----Continued.

NAMES.	AMOUNT REMITTED.	AMOUNT CHARGED ON ACCOUNT OF SALES, &c.	TOTAL AMOUNT CHARGED.	TOTAL AMOUNT AC- COUNTED FOR.	REMARKS.
Cpl. H. Leavenworth	\$300 00	-	\$300 00	\$300 00	Closed
Mr. Thomas Spangler	1,042 00	-	1,042 00	1,042 00	Do
Lieut. Nathan Clark	do	-	102 95	102 95	Disbursing
John Phillips	do	-	2,051 72	2,051 72	Do
Claude Thomas, acting	do	-	142 56	142 56	Do
George G. Hatter	do	-	2,025 98	2,025 98	Do
J. Boggs	do	-	870 00	870 00	Do
Capt. James Green	do	460 00	6 81	466 81	Closed
Lieut. J. Thompson	do	-	324 87	324 87	Disbursing
Thomas Childs	do	-	97 74	97 74	Do
William Wills	1,870 00	190 62	2,060 62	2,044 94	Do
Henry Saunders	do	400 00	80 70	420 70	Do
George W. Gardiner	do	-	131 95	3,461 05	Do
Harvey Brown	do	-	-	7,920 00	3,443 83
Allen Lowd	do	-	5 00	1,555 00	Do
N. G. Dana	do	430 00	112 40	552 40	1,533 55
Thomas J. Baird	do	-	13 62	588 62	Do
H. W. Fitzhugh	do	-	-	652 72	Do
William L. McClintonck	do	-	2,325 00	2,325 00	Do
Capt. Joseph Plympton	do	2,665 06	8,509 64	11,173 70	2,346 70
Lieut. Walter Smith	do	800 00	-	800 00	Do
Otis Wheeler, acting	do	525 00	12 00	537 00	Closed
Elijah Lyon	do	-	142 92	142 92	Disbursing
John B. Triplett	do	-	1,610 17	1,610 17	Closed
Capt. James H. Hook	do	-	481 90	481 90	Disbursing
Lieut. B. L. E. Bonneville	do	7,600 00	-	7,600 00	Closed
John B. Hoblitzel	do	479 00	97 65	576 65	Do
Horne Bliss	do	500 00	-	300 00	Do
Jeremiah Yancey	do	-	800 00	800 00	Disbursing
Wm. N. Brumbaugh	do	-	499 78	499 78	Closed
Capt. C. Powell	do	300 00	65 55	365 55	Do
Lieut. Washington Wright	do	-	4,418 09	4,418 09	Do
Charles Muller	do	-	100 52	4,054 85	Closed
Andrew McIntyre	do	-	133 11	2,353 11	Do
Joseph P. Taylor	do	2,120 00	50 81	2,363 81	Disbursing
Joseph N. Chambers	do	595 00	142 95	637 95	Do
Clifford Wharton	do	470 00	142 95	612 95	Closed
Campbell Graham	do	637 23	-	337 23	Do
J. B. F. Russell	do	500 00	226 79	526 79	Do
Walter Bicker	do	379 64	1,068 57	1,449 21	Do
Richard Barche	do	-	17 06	177 06	Dishbursing
John Pickell	do	-	167 18	167 18	Do
William Day	do	-	16 02	16 02	Closed
Major Henry Stanton, acting	do	1,800 00	-	1,800 00	Do
Lieut. Aaron M. Wright	do	-	238 75	238 75	Do
Capt. Joshua B. Brant	do	-	5,471 04	5,471 04	Closed
Lieut. J. R. Wdrux	do	-	-	148 82	Do
Samuel Wragg	do	-	45 00	45 00	Do
H. J. Felius	do	-	271 99	271 99	Do
	\$281,119 93	\$55,099 77	\$276,319 70	\$254,278 93	

RECAPITULATION.

Total amount charged - - - - - \$276,519 70
 Total amount expended and accounted for - - - - - 254,278 93

Balance in the hands of the Assistant and Acting Assistant Commissioners, to be accounted for in the 4th quarter of the year - \$22,240 77

OFFICE OF THE COMMISSARY GENERAL OF SUBSISTENCE,

WASHINGTON, 22d November, 1823.

GEO. GIBSON, Commissary General of Subsistence



E.

*Report of the Surgeon General.***SURGEON GENERAL'S OFFICE.***November 24, 1823.*

SIR: In compliance with your orders, I have the honor to state, that the amount disbursed on account of the Medical Department, in the three first quarters of the present year, was \$15,056. All the bills presented during this period, have been paid; all moneys advanced have been expended, and were regularly and satisfactorily accounted for, without loss to the United States; and but \$200 have been advanced during the present quarter.

The supplies for the year were forwarded to the several posts at an early period; and were in general reported to have been received in good order, and to be of a good quality. They also appear to have been abundant in quantity, an extra requisition having been made at but few posts, in consequence of an unexpected increase of the number of troops, or unusual expenditure from the prevalence of summer complaints.

Nearly all the surgeons have been constantly on duty during the year, with the exception of those confined by sickness; and the furloughs granted have been for short periods. Returns have regularly been made of every article of public property under their charge, and, on examination, have been found strictly correct, and the quantity expended to be duly proportionate to the reports of sick.

With the exception of those stationed at Baton Rouge, the troops have in general been healthy. The number of deaths reported at all other posts, during the two first quarters of the year, was but 43, of which seven were from casualties.

From the returns and reports of the Surgeons, as well as from other sources of information, it appears that the hospitals are well furnished with every thing necessary for the comfort and recovery of the sick; and from the talents, acquirements, and industry of the medical attendants, it is confidently believed, that the soldier has now a much better opportunity for recovery, than he could have in any other situation in which he would probably be placed.

Very respectfully, your obedient servant,

JOS. LOVELL,

Surgeon General.

Hon. J. C. CALHOUN.

F.

Statement of the Commissary General of Purchases—S, 4 & 5.

No. 3.

STATEMENT of moneys received and disbursed during the three first quarters of the year 1823, on account of the Purchasing Department.

To amount of sundry warrants issued by the Secretary of the Treasury, in favor of Callender Irvine, Comm'y General of Purchases, to the 30th of September, 1823, as per statement, No. 1. - - -	\$116,206 00
By amount of disbursements during the first quarter of 1823, passed to the credit of the Commissary General by William Lee, Esq. Second Auditor, Treasury Department - - -	\$33,282 08
By ditto during the second quarter of 1823 35,825 31	
By amount of my accounts for the third quarter of 1823, now before the Second Auditor for settlement - - -	23,612 98
	\$92,720 37
By a transfer to the appropriation for the purchase of woollens for 1823, directed to be made, per Wm. Lee, 2d Auditor	50,059 05
	122,779 42

COMMISSARY GENERAL'S OFFICE,

Philadelphia, November 15, 1823.

C. IRVINE, Comm'y Gen. Purchases.

J. C. CALHOUN, Esq.

Secretary of War.

No. 4.

STATEMENT of moneys received and disbursed during the three first quarters of the year 1823, on account of the "appropriation of 1822, for the purchase of Woollens, for 1823."

To amount of transfer from the Purchasing Department, per order of Wm. Lee, Second Auditor,	\$ 30,059 05
To amount of warrant issued by the Secretary of the Treasury, in favor of Callender Irvine, Commissary General of Purchases, to the 30th Sept. 1823, as per Statement No. 2,	22,600 00

	\$ 52,659 05
By amount of purchases during the second quarter of 1823, passed to the credit of C. Irvine, Commissary General, per William Lee, Esq. Second Auditor, Treasury Department,	\$ 20,123 99
By amount of my account for the third quarter of 1823, now before the Second Auditor, for settlement,	24,350 95

	\$44,474 94

COMMISSARY GENERAL'S OFFICE,
Philadelphia, Nov. 15th, 1823.
 C. IRVINE, *Comm. Gen. of Purchases.*

J. C. CALHOUN, Esq.
Secretary of War.

No. 5.

COST of CLOTHING for the Army of the United States, during the year 1824.

Forage Cap,	-	-	-	-	\$ 0	40
Leather Cap,	-	-	-	-	1	50
Oil cloth, cap cover,	-	-	-	-	0	45
Pompoms,	-	-	-	-	0	20
Bands and Tassels,	-	-	-	-	0	12
Cockades and Eagles,	-	-	-	-	0	6 $\frac{1}{4}$
Cap Plates,	-	-	-	-	0	8
Cap Scales,	-	-	-	-	0	60
Worsted Wings, per pair,	-	-	-	-	0	55 $\frac{1}{2}$
Grey Woollen Overalls,	-	-	-	-	2	27
Drilling Overalls, Privates,	-	-	-	-	0	87
Drilling Overalls, Sergeants,	-	-	-	-	1	01
Cotton Jackets with Sleeves, Infantry Privates,	-	-	-	-	1	05
Ditto	-	-	Sergeants,	-	1	22
Ditto	-	-	Artillery Privates,	-	1	11
Ditto	-	-	Sergeants,	-	1	28
Woollen Jackets, Artillery,	-	-	-	-	2	93
Ditto	Infantry,	-	-	-	2	82
Cotton Shirts, Privates,	-	-	-	-	0	72
Ditto	Sergeants,	-	-	-	0	75
Flannel Shirts,	-	-	-	-	1	27 $\frac{1}{2}$
Flannel Drawers,	-	-	-	-	1	00
Fatigue Frocks,	-	-	-	-	1	10
Fatigue Trowsers,	-	-	-	-	0	78 $\frac{1}{2}$
Laced Bootees, per pair,	-	-	-	-	1	62 $\frac{1}{2}$
Shoes,	-	-	-	-	1	25
Stockings,	-	-	-	-	0	40
Socks,	-	-	-	-	0	21
Leather Stocks,	-	-	-	-	0	14 $\frac{1}{2}$
Blankets, Woollen,	-	-	-	-	2	70
Great Coats,	-	-	-	-	7	00
Infantry Coats, Privates,	-	-	-	-	5	81
Ditto	Sergeants,	-	-	-	5	81
Ditto	Musicians,	-	-	-	2	53

Statement Continued.

Artillery Coats, Privates,	-	-	-	-	6	00
Ditto Sergeants,	-	-	-	-	6	00
Ditto Musicians,	-	-	-	-	7	72

COMMISSARY GENERAL'S OFFICE,*Philadelphia, November 15, 1825.***C. IRVINE,***Commissary General of Purchases.***J. C. CALHOUN, Esq.***Secretary of War.*

G.

Report of the Chief Engineer, with Tables D, E, and F.

ENGINEER DEPARTMENT,

November 20, 1823.

SIR : In pursuance of your order of the 5th instant, I have the honour to report the application of the appropriations of this year, referring to the several fortifications, and the Military Academy; the works projected by the Board of Engineers, which have not been commenced, and the estimates of their cost; the present state of the fortifications under construction; the duties upon which the Board of Engineers, and the Topographical Engineers, have been employed during this year; and the condition of the Military Academy.

The accompanying Tables, D, E, and F, and the Reports A and B, afford part of the information proposed above to be furnished by this Report.

Table D exhibits the application of the sums appropriated this year for the several fortifications.

Table E exhibits the amount drawn for the three first quarters of this year, and the amount of accounts rendered for settlement under the respective appropriations.

Table F exhibits the works projected by the Board of Engineers, which have not been commenced, and the estimates of their cost. The projects of a number of works, in addition to those contained in this Table, have been completed by the Board of Engineers, but their Report of them not having been received, they could not be included in the Table, which, as it now stands, does not differ from that reported last year.

Report A, of the Board of Engineers, in conjunction with Commodore Bainbridge of the Navy, relates to the practicability and utility of establishing a Breakwater at the mouth of Delaware Bay, near Cape Henlopen, to form a harbor for the protection of vessels against floating ice and heavy gales. The Report submits two projects, illustrated by drawings, and contains a detailed estimate of the expense for each.

Report B, of the Board of Engineers, exhibits the result of its examination of the harbor of Presque Isle, on Lake Erie, and furnishes a project for the removal of the bar obstructing its entrance, illustrated by drawings and a detailed estimate of the expense of effecting it.

The drawings above referred to are on file in this Department.

The appropriations of the year 1822 for the several fortifications, amounting to \$370,000, and for the Military Academy, amounting to \$13,979, have been expended upon the objects to which they were respectively applicable; and the accounts for the same have been rendered and settled.

All of the amounts drawn in the three first quarters of the year 1823, will have been satisfactorily accounted for, when a small portion of the accounts, not yet rendered for settlement, but daily expected, shall have been received. There has been no defalcation in any of the agents under the Engineer Department; the delay in the rendition of the small portion of accounts not received, having been produced, with respect to those for Rigolets and Chef Menteur, by the failure of the Department to transmit the requisite funds in season, and, with respect to the others, by causes which have been satisfactorily explained.

The several fortifications under construction, and those which have been, since the last Annual Report, commenced, have progressed in as satisfactory a manner as circumstances would permit. The workmanship in every instance is of the most respectable character, and the materials all of the best kind and most durable nature.

Fort Delaware is so far completed that it will be ready to receive its guns and a garrison in the ensuing spring. An unusual degree of sickness prevailed in the Delaware the last fall, whereby the Engineers and men employed at the fort suffered very much, and had for a time to discontinue the works; otherwise this fort would have been completed within this year: however, its present state is such as, with no great exertions, it might be rendered immediately a formidable defence to the river Delaware. It will be completed in the course of the ensuing season with the remainder of the appropriation applicable to that purpose.

Fort Washington is completed, with the exception of some objects of minor consideration, which the residue of the appropriation is adequate to effect.

Fortress Mouroe begins to present a formidable appearance; the exterior wall, ten feet thick at its base, is carried on an average all round the place to the height of twelve feet; and a wet ditch surrounds the whole work. A battery on the covert way is constructed capable of receiving forty-two pieces; and in the three fronts of the fortress on the sea side, embrasures are partly constructed for eighty-four guns; so that in case of necessity a battery of one hundred and twenty-six heavy guns might readily be mounted for the protection of Hampton Roads.

The mole on the Rip Rap shoals, on which fort Calhoun is to be erected, has progressed very satisfactorily also. The mole is now about six feet above the water; and has withstood the violence of the sea in such a manner as to prove its solidity and the permanency of the foundation. It already exhibits to the eye the advantages which this position, in connexion with fortress Monroe on Old Point Comfort, possesses in defending Hampton Roads. Great care has been manifested by the Engineers in carrying on these works, and the execution of the workmanship is creditable to the superintending officer.

The work at Mobile Point progresses slowly, but satisfactorily: a large quantity of materials is collected there under the late appropriation.

The works at the Rigolets and Chef Menteur have been prosecuted with all the vigor which the circumstances of the climate would admit. The fort at the Rigolets is nearly completed, and that at Chef Menteur commenced, and well advanced.

The new work at Plaquemine Bend on the right bank of the Mississippi, opposite to Fort St. Philip, called Fort Jackson, has been located, the land around it cleared and drained, and a number of materials collected. This work was also retarded by the sickness which prevailed there last season; but, notwithstanding, the local Engineer reports, that the whole of the sums appropriated to that work will be applied in the course of the month of January next.

The repairs contemplated by the act of Congress of the last session, on Fort Jackson, at Five Fathom Hole, in the Savannah River, below the city, have been completed.

The progress of the Board of Engineers in its labors, comprehending the Topographical Engineers, from the commencement of this year, has been extensive and important. The Board of Engineers has been engaged, in the course of the year, on projects for the defence of Boston, Salem, and Marblehead in Massachusetts; Portsmouth in New Hampshire; Portland in Maine; and the mouths of Cape Fear River and harbor of Beaufort in North Carolina: in which period all the plans and estimates for the three first places have been completed; those for Portsmouth carried as far as possible without farther surveys; those for House Island and Fort Preble Point, Portland harbor, completed, there being a little more levelling necessary before the other defences of the harbor could be begun; the plans and estimates for the defence of Cape Fear River completed, with the exception of a small work on Federal Point; and those for a work for the defence of Beaufort harbor nearly finished.

The Board, in conjunction with Commodore Bainbridge of the Navy, visited the capes of the Delaware, to examine the practicability of establishing a Breakwater there, for the protection of vessels from ice and tempests; and projected plans and estimates for that purpose. In the course of the summer, the Board examined the harbor of Erie, on Lake Erie in Pennsylvania, with a view to its improvement, and furnished a project and estimate for that purpose.

The Board examined the proposed canal from the mouth of the Lehigh river in Pennsylvania to the tide water of the Passaic in New Jersey, and made a report in detail on the practicability, expense, and advantages, of the canal in a local and national point of view. The Board also entered upon an examination of the proposed canal between the Delaware and Chesapeake in the course of the summer, and are now engaged on the same project.

The Topographical Engineers have been engaged as follows: In surveying Portsmouth harbor, in New Hampshire; the Patuxent river; the St. Marys' river and harbor; surveying and levelling Hawkins' Point and its vicinities, in Maryland; the harbor of Charleston in South Carolina; in locating the lead mines on the Mississippi, leased to individuals under the law; in ascertaining the practicability of opening a communication between the turnpikes in the rear of West Point and the Putnam turnpike, which terminates at Cold Spring on the left bank of the Hudson opposite to West Point; in assisting to ascertain the practicability of opening a communication by canals between the Conewaga falls on the Susquehannah, and Baltimore, and between the Conewaga falls and tide water of the Susquehannah; and in plottings and drawings relating to the surveys above mentioned, and of others previously made; and also in exploring a part of East Florida; and the western waters, by the St. Peter's to the 49th degree of north latitude, thence to Lake Superior and the Sault St. Mary; and in preparing for publication an account of the last mentioned expedition.

The Military Academy, although in a respectable state last year, has since evidently improved in every respect. The regulations which had been under experiment have been fairly tested as to their efficiency; and have, with some additions and modifications, been approved and printed for the use of the institution; so that each individual possessing a copy may conform with exactness and readiness to their injunctions. The number of Cadets at this time attached to the Academy amounts to two hundred and fifty-three, and the number which has been graduated and attached to the Army this year, amounts to thirty-six.

Respectfully submitted.

ALEXANDER MACOMB,

Maj. Gen. Chief Engineer.



PRAIRIES IN, ETC.

ACCOMPANYING a Report of the Chief Engineer to the Secretary of War, dated 20th Nov. 1823.

TABLE D.

BENEFITTING the application of the sum appropriated in the year 1823, for the several Fortifications designated.

REMARKS.			
REPLACEMENT OF THE FORTS APPROPRIATED IN PRO. VI. 1832.			
	Amount appropri- ated.	Amount expended from the Treasury in the due first quarter.	Amount expended in the due first quarter.
On Delaware	\$55,000 00	\$14,500 00	\$26,352 80
Washington	46,000 00	23,300 00	19,514 14
Virginia	100,000 00	78,300 00	73,554 25
Montgomery	80,000 00	77,900 00	71,812 05
Cahoon	50,000 00	34,500 00	64,153 99
Colombia (for collecting materials)	100,000 00	75,000 00	67,253 40
At Mobile Point (for construction)			32,736 60
On the right bank of the Mississippi, opposite Fort St. Philip, (for collecting materials, &c.)	40,000 00	15,000 00	8,374 87
Over Jackson (for repairing)	\$5,000 00	4,000 00	3,355 30
			34,638 13
			Coupled.
			\$5,000 00
			338,319 83
			167,590 46
			\$25,000 stated.

TABLE E

EXHIBITING the amounts drawn for the three first quarters of the year 1823, and the amount of accounts rendered for settlement during the same period, under the respective appropriations designated.

DESIGNATION OF APPROPRIATIONS.		AMOUNT OF ACCOUNTS RENDERED FOR SERVICE IN THE FIRST QUARTER OF THE YEAR 1823.		REMARKS.	
For Delaware	-	\$31,500 00	52,365 95	\$30,000, and for the several fortifications, amounting to \$1,399.90, have been expended upon the objects to which they were respectively applicable; and the accounts for	
Washington	-	24,781 73	65,616 40	the same have been rendered and settled.	
Monroe	-	84,598 44	71,815 40	All of the amounts drawn in the three first quarters of the year 1822, will have been satisfactorily accounted for when a small portion of the accounts, not yet rendered, will be received.	
Calhoun	-	78,543 00	41,913 48	In daily expectation.	
Port at Mobile Point, for collecting materials	-	63,500 00	60,906 00	There has been no deduction in any of the accounts under the Engineer Department, produced, with respect to those for Rigouts and Chief Menour, by the failure of	
Port at Regulus and Chief Menour	-	75,000 00	16,372 99	the Department to furnish the requisite funds in season, and, with respect to the small portion of accounts not received, having	
Repairing Fort St. Philip	-	55,398 66	3,636 43	others, by causes which have been satisfactorily explained.	
Repairing Fort Jackson, on Savanah River	-	4,000 00	3,636 43		
Repairs and contingencies of fortifications	-	10,925 98	7,710 19		
Repairs and contingencies of fortifications	-	9,371 76	13,826 56		
Military Academy	-	1,365 62	1,365 62		
		407,248 91	356,600 16		

TABLE I

A HISTORY OF THE INSTITUTION OF CIVIL ENGINEERS 21

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A.

Report accompanying the Report of the Chief Engineer to the Secretary of War.

PHILADELPHIA, July 14th, 1823.

In obedience to instructions from the War and Navy Departments, of the 7th of June last, the undersigned having made such personal examination as they found necessary, and collected all the information within their reach, as to the utility, the practicability, the situation, the magnitude, and the cost of a projected Pier or Breakwater, near the Capes of the Delaware, for the protection of vessels against ice, and against tempests, have the honor to submit the following report:

1st. On the utility of a Pier or Breakwater, near the Capes of the Delaware, which will protect vessels against floating ice and wind.

The Delaware Bay is not only obstructed by fixed ice, during a part of the winter, but it is without a harbor near its mouth, in which vessels can secure themselves, either against winds blowing from the N.W. to the S.E. round by the N. or against floating ice. It is frequently the case, that the navigation of the bay is impeded by the ice, as early as the month of December, and it is often open for eight or ten days, and sometimes longer, between the 20th of December, and the 15th of January, yet it closes again, and remains shut until the 20th of February, or even the 1st of March. For two months at least, therefore, between December and March, vessels bound up the bay will be uncertain as to their passage to the city; and, being without shelter when they arrive at the Capes, will be exposed to the greatest dangers, should they find the passage obstructed. As to the vessels departing from this port, it is true, they can choose a favorable moment for descending the river; but should they be met by adverse winds at the Capes, they also will be exposed to be driven ashore by the winds, or destroyed by the ice.

These general considerations shew how important it is, that something be done to secure, if possible, a safe anchorage near the mouth of this great communication with the ocean; but, it is proper, by some details, to show more fully in how high a degree this subject merits the attention of government.

From information received through the Chamber of Commerce, it appears, that the tonnage exclusively belonging to, and registered in, the port of Philadelphia, in 1810, when the population of the city

and county, amounted to 111,210, was 124,430; and in 1820 when the population amounted to 137,097, was 78,837.

Now, if the tonnage had increased in the same ratio as the population, it would have been, in 1820, 153,394, instead of 78,837: consequently, the tonnage of the port of Philadelphia in 1820, may be said to have been but about half of what it was in 1810.

Though this great diminution is to be ascribed to various causes, there is no doubt that the want of a good harbor at the mouth of the bay, is one of very great influence: owing to this want, many vessels postpone their departure from foreign ports, thereby incurring very great expenses, or, arriving off the Capes at the unpropitious season, are obliged to bear away for some neighbouring port. As to those which run the risk of the passage up the Bay, many are much damaged, and others entirely lost. In the winter of 1809-10, a large number of vessels, in attempting this passage, were either destroyed in the bay by the ice, or wrecked upon the shore, or lost at sea, while in pursuit of a harbor of safety. Since that period, the captains have orders not to incur the like risk; and the winter arrivals are comparatively few. The regular packet-ships, which come upon the coast in winter, are often obliged to bear away for New York, there to land their cargoes, the transportation of which, owing to the badness of the roads at that season, is both tedious and costly.

If there were a harbor at the mouth of the bay, vessels could drop anchor within it, to wait for the first favorable chance to reach New Castle, whence they could easily proceed to Philadelphia, by taking advantage of the openings in the river, between those two places, which occur two or three times every winter. In like manner, vessels despatched from Philadelphia, would descend to New Castle, and thence to the mouth of the bay; there to wait, if necessary, until the proper moment to proceed to sea.

Besides the embarrassment to commercial intercourse, the loss of time, and the increase of expenses, which are consequent upon the present state of things; the premium of insurance is greatly increased by the dangers to which vessels in winter are exposed at the mouth of the Delaware. This premium is from $\frac{1}{2}$ to $1\frac{1}{2}$ per centum, above the customary rate; and in cases which become desperate from the casualties to which vessels are exposed, in the attempt to enter the Delaware, insurance is either refused, or an exorbitant premium demanded.

As to the losses of vessels which have actually happened, for want of a proper shelter, it is difficult, though they have unquestionably been numerous, to determine the number, or to state the amount of property. They can only be ascertained, by research amongst the journals of the period, and amongst the records of the several Insurance Offices, both in this city and elsewhere, to which research, the commission does not feel warranted to devote the time it would require: but thus much appears to be certain, that the ship owners in Philadelphia, in consideration of the trouble, risk, expense, and loss, of the navigation, do not order one in ten of their vessels to this port

in winter, and also, that if there were suitable shelter, they would engage, with enterprize and confidence, in all the chances of commercial speculation.

Although it is difficult to specify the amount of the losses sustained; although the annual amount has been decreasing with the reduction of the tonnage, and the greater precaution on the part of the merchants; still, some idea may be formed of it from the circumstance, that a single East India or China ship is often worth half a million of dollars, that is to say, two or three times as much as would be the cost of a breakwater, near the Capes, to shelter a dozen vessels.

We have thus far examined the advantages to result from an artificial harbor; with reference only to the commerce of the Delaware; but they will be found of scarcely less moment to the coasting navigation of the nation at large. The great number of shipwrecks upon the coast of Jersey and Delaware proves that the winter navigation of that coast, is attended with imminent peril; and we may safely affirm, that a project which shall place a secure harbor at the mouth of the Delaware, lying, as it will, about midway between the distant harbors of New York and the Chesapeake, and being always accessible, with the winds which are most dangerous, will produce a result of incalculable value, whether we consider the saving of property, or of human life.

2d. On the practicability of constructing a pier or breakwater, which will afford shelter for vessels, and have, in itself, such stability as to resist the most violent efforts of floating ice, and of gales of wind.

The Commission have ascertained that the ravages of the worm, in the lower part of the bay, would soon destroy any wall, in which timber entered as an essential part; and they are convinced, were it otherwise, as respects timber, no dependence could be placed in the stability of a work, having an envelope of timber, unless such a form were given to it as would, in fact, make the envelope a very expensive, and, at the same time, a nearly useless appendage. The form here spoken of has reference to the profile or transverse section, and is one in which the breadth at bottom, being very great, compared with that at top, the slopes of the sides are so gentle, that the stone composing the mass are retained firmly in place by their own weight: to this form of structure has been applied, in a memorable example, where the objects in view were similar to the present, the term of breakwater.

With the complete success which has attended the stupendous works of the Jetté of Cherbourg, and the Breakwater of Plymouth, (just alluded to,) the Commission cannot hesitate as to the practicability of constructing a breakwater in the Delaware, which will be lasting in itself, and secure permanently the advantages which are sought. This confidence is founded on a comparison of the exposure of the works above cited, with the exposure of the situation which may be selected in this bay, on a comparison of the nature of the bottom, and the direction and force of the tides; and, on the advan-

tages we shall derive from a knowledge of the difficulties encountered; the manner in which they were overcome; and the very faults of design and execution in those great works.

3d. On the situation which the proposed breakwater should have:

As the dangers, from which the breakwater is to be a guard, are encountered at the very mouth of the Delaware, it is obvious that a situation for it must be selected as near the Capes as possible; and, it must be here added, that its utility, as respects the coasting navigation, depends on this condition. Over all the broad expanse of water which separates the Capes of the Delaware, but two situations occur where an artificial harbor could be constructed, with any hope of advantage; and the first of those, namely, the roadstead under Cape May, is too shallow; its access is attended with too much danger; and it is too much aside from the main channel, up and down the bay, to require further mention.

The other situation is the roadstead between the Shears and Cape Henlopen; and referring to chart herewith to illustrate the subject more in detail, we will now describe this roadstead.

A shoal called the Shears lies just within the Capes of Delaware, and about three miles from the Cape Henlopen shore; though it is so delineated upon existing maps, it is by no means an insular shoal; but it is the seaward part of an extensive bank, making out from the Delaware shore, at and near the mouth of Lewistown Creek; the ridge or shoalest part of this bank runs from Low-Plumb-Point, first northeasterly $2\frac{1}{4}$ miles, then easterly $2\frac{1}{2}$ miles, and lastly, southeasterly $3\frac{1}{4}$, making the length of the bank from Low-Plumb-Point, following the course of the ridge, about 8 miles. Its breadth is variable—of that part called the Shears, the extreme breadth is nearly two miles; from the tail of the Shears to Cape Henlopen is $2\frac{1}{2}$ miles. Considering the shoal limited, as in the chart herewith, by $3\frac{1}{2}$ fathoms at low water, the soundings upon it vary from that depth to one foot. South of the tail of the Shears, and separated from it by a narrow channel of $4\frac{1}{2}$ to 5 fathoms, lies a small shoal, having about 18 feet water. It is between the great bank or shoal and the Delaware shore, and having for its outline the opposite concavities of the shoal and the shore, that the roadstead above mentioned is found. The average depth within the road is about $4\frac{1}{2}$ fathoms, and at its mouth about 6 fathoms at low water.

Though highly important and valuable in many respects, this road is, nevertheless, much exposed to certain winds, and entirely so to floating ice: on consulting the chart herewith, it will be seen that easterly winds blow directly through the chaps of the roadstead, and that the direction of the ebb-tide sweeps into and through it a large part of the ice of the bay; it was to guard against this latter danger, chiefly, that the project now before the Commission was first conceived.

We come now to the consideration of what particular part of this roadstead is most suitable for the creation, by means of a breakwater, of an artificial harbor, which, at a minimum expense, will fulfil all

the essential conditions of such an establishment. These conditions are, 1st. Security from winds. 2d. Security from ice. 3d. Security from an enemy.

As to the first condition, if a position be taken at A, on the southern margin of the Shears, it will be sufficiently under the lee of the main to be protected from all winds from S. E. by S. to W. (round by the S.) and by the shoal off Low-Plumb-Point and the Shears proper, it will be so much protected from winds blowing from W. to E. (round by the N.) that the profile of this part of the breakwater may be made comparatively weak, and at small expense against winds from E. to S. E. by S. (South by) the breakwater alone must afford protection, and must be made proportionably strong. A breakwater so constructed here as to guard against winds, will also afford security against ice, and thereby fulfil the second condition. As to the 3d condition, however, it would be defective: the distance from the main is too great for it to be well defended by works upon the shore, and fortifications upon the spot itself would involve considerable expense.

The condition of complete security from an enemy obliges us therefore to abandon this position, and to seek for one, not otherwise objectionable, nearer the shore.

Referring now to the plan marked B, just within the pitch of Cape Henlopen, it will be seen that a harbor there will be entirely sheltered from all winds from E. to W. N. W. (round by the S.) but, being distant from the Shears, will not be sensibly benefitted by the lee of that shoal, and, consequently, will require a strong breakwater against all winds from the other thirteen points of the compass. In this position, as in the other, the embankment against the winds and waves may be so contrived as to give entire security from the ice, while its proximity to the shore will enable a fort, properly situated there, to protect it against all enterprises of an enemy.

In the selection which, under all circumstances, the Commission make of this last position B, for this artificial harbor, they adopt the hypothesis, that the expense, though great, will not be disproportionate to the magnitude of the benefits to result, in common, to the commerce of the nation, and to that of the Delaware; and the Commission cannot hesitate as to the correctness of the hypothesis. But it often happens that works of the utmost national importance, are necessarily postponed or neglected, for want of means in the government, or, that they are for the same reason, or because their success is half problematical, carried on slowly, or attempted but partially. From these considerations, in connexion with the great expense of a complete breakwater, the Commission have been induced to seek for some mode of securing a partial benefit, at a cost so moderate, as, under any circumstances, to warrant the undertaking. They the rather infer this to be their duty, from the small appropriation to the object in view, in the law of Congress which accompanied their instructions. The Commission are not, however, to question the ability, nor to judge of the disposition of the nation in this respect; but

furnishing the best information they can obtain, and their own deliberate opinion, in reference both to a complete and a partial work, to lay the matter fairly before the government for its decision. Two projects will, therefore, be presented: one, designed to afford a complete, spacious, and defensible harbor; the other intended to protect, at a minimum of expense, a limited number of vessels.

The situation for the first, has already been described. On examining for a proper site for a small breakwater, the Commission found the conditions of security from ice and winds not easily reconcileable with that of security from an enemy, there being no place near the shore in which a small breakwater can be made, to guard against both ice and wind.

The course of the ebb tide is there nearly parallel with the shore; the breakwater, therefore, which should be so placed as to arrest and deflect the floating ice, would leave the vessels, intended to be covered, still exposed to the action of the north easterly gales; consequently, an equal length, at least, would be required against the winds as against the ice. A harbor for three or four vessels would not be made, under these circumstances, without a very considerable development of breakwater.

Going to the opposite side of the roadstead, however, we find, that the Shears, being themselves a good breakwater against the northerly, northeasterly, and easterly winds, (with the help of certain means, hereafter recommended,) an embankment against the ice alone, will give a harbor of considerable capacity, which will be safe, as to both ice and winds. It is true, that, in resorting to this position, we relinquish the condition of entire safety from an enemy, only to be attained near the shore; but, it is also true, so far as our judgment is correct, that there is no alternative.

A few observations will be made here, however, as tending to diminish the objection to this position. 1st, A battery of heavy guns and sea mortars upon the shore would make the situation of an enemy's vessels, even in the harbor, something hazardous, and would bear, with much effect, upon his vessels, when attempting to enter, or to leave the roadstead. 2d, Should an enemy succeed in stationing his ships within the harbor, and not be molested while there, either by works on the shore, or by the floating defences, which would, in time of war, be stationed near the mouth of the bay, he would not be able to enforce a blockade, without passing, in every attempt, within range of the works. 3d, The object of an enemy being to blockade the bay, he would derive but little advantage from the harbor; because, during eight or ten months in the year, a man of war would find safe anchorage over every part of the surface of the bay; and hence, if it be considered important to prevent the blockade, a floating force must, in every case, be provided. 4th, and lastly, As the advantages of the harbor become more apparent, the commerce benefitted by it more extensive, and the means of the country, more ample, the harbor may be progressively enlarged, and a battery erected upon the Shears, for its protection.

Fourth. On the extent and form of the breakwater.

1st. As to the complete harbor at the position B.

Going far enough from the shore to leave about half a mile in breadth, of good anchorage, we draw the line *b c*, of 740 yards. The direction of this line must be such, that the course of the ebb-tide will make, with it, a very oblique angle. From the western extremity of this line, we draw the line *a b*, (towards the shore,) at an angle of 135° , to which we give a length of 440 yards; and from the eastern end, we draw the line *c d*, at the same angle, of 580 yards in length. It will be seen, by an inspection of the chart, that the ice which will strike a breakwater, made according to the above delineation, will be deflected outwardly, while that which passes within the extremity *b* will course along near the shore, leaving a broad space entirely clear. It will be seen too, that, while by the shore or the breakwater, all winds will be entirely excluded except the east-northeastwardly, that there will be a large space secure even from these. The area of this harbor will be about half a mile square; the mean depth at low water being 28 feet, the whole length of the breakwater will be one mile. The bases of the interior slopes of this work will be one half the altitudes: but the exterior, being exposed to a heavy sea, will require for the slopes bases of four times the altitudes. The side facing the northeast will be finished at high water mark, while the other two sides must be raised three feet higher, to keep the ice from being forced over into the harbor.

2d. As to the partial breakwater at the position A.

From the point *c*, which is in about 12 feet water, we draw the line *e f*, of 1,100 feet, so as to form with the course of the tide an angle of 120° . This line is so far up the roadstead, that a vessel anchored behind it at the distance of 800 yards, will be protected from E.S.E. winds by the lower part of the shears; and here it is proper to remark, that the winds blowing from between E.S.E. and S.E. are neither violent nor of long continuance. It will be perceived on the chart, that, from the direction we have given to the breakwater, the descending ice will be deflected towards the deepest water and strongest current, and that vessels, to the number of twelve, moored in two lines behind the breakwater, will be protected either by the shoal or by the main land, from all winds, excepting those just mentioned.

It has frequently been remarked above, that the shoal itself is a good breakwater, and there is no doubt that vessels, provided with good ground tackle, could ride under its lee in safety; but it is proper to provide against deficiency in this respect, which may be often expected with merchant vessels; therefore, the Commission propose to fix, in addition to the breakwater, two lines of heavy anchors, connected with buoys, by strong chain cables. These buoys, cables, and anchors, will not only enable vessels to ride in safety, but the buoys will guide the vessels as they arrive at their proper stations in the harbor, thereby ensuring the greatest economy of space. The length of the line of breakwater is just sufficient to cover the vessels

from the passing ice, when they happen to be riding with a scope of sixty fathoms parallel to the breakwater.

The mean depth in the harbor, at low water, will be 21 feet.

As this work will not be exposed to a violent sea from any direction, it is considered sufficient to make the base of each slope equal to twice the altitude.

5th. Estimate of the Expense of a Breakwater.

1st. As to a complete harbor at the position B.

In the left flank of the breakwater, there will be,

In the centre of	do.	5,817,975	cubic feet.
In the right flank	do.	11,346,420	do.
		9,744,251	do.
	Total,	26,908,646	cubic feet.

26,908,646 cubic feet equal to 996,616.52 cubic yards.

One perch, or 24.75 cubic feet, at \$2 00, is 2.1818 per cubic yard; 996,616.52 cubic yards of stone, promiscuously thrown in to form the mass, each stone weighing from $\frac{1}{2}$ to 4 tons; for materials and labor, at \$2.1818 per cubic yard, 2,174,417 92

Add for unforeseen expenses 7 per centum, 152,209 25

Total expense of complete breakwater, \$2,326,627 17

2d. As to the expense of a partial harbor at the position A.

In the whole of the line of breakwater there will be 2,585,536 cubic feet, or 95,760.592 cubic yards.

One perch, or 24.75 cubic feet, at \$2, is \$2.1818 per cubic yard; 95,760.592 cubic yards of stone, promiscuously thrown in to form the mass, each stone weighing from $\frac{1}{2}$ to 4 tons; for materials and labor, at \$2.1818 per cubic yard, 208,930 46

Add for unforeseen expenses 5 per cent. 10,446 52

Cost of breakwater, \$219,376 98

Add for moorings:

12 cast iron anchors, each of 30cwt. at \$70 per ton,	1,260 00
12 chain cables, of 12 fathoms each, of 1½ inch iron; at one end of each chain a ring, of 12 inches diameter in the clear, to be made of 2 inch iron, to receive the end of the vessel's cable, which rings should be puddled = 144 fathoms, at \$10 50 per fathom,	1,512 00
12 buoys for the chains, say at \$30,	360 00
	3,132 00

Total expense of partial breakwater and moorings, \$222,508 98

On concluding this report on an artificial harbor, the commission take the liberty of recommending to the notice of government some other matters, which, though not within the reach of their instructions, are not only important in themselves, but strictly analogous in their tendency to those they have been considering: These are,

1st. The necessity of a Beacon Light near the extremity of Cape Henlopen.

The light on this Cape is elevated near 200 feet above the level of the ocean, and is at least one mile from the pitch of the Cape. In connection with the circumstances of elevation and distance, it is difficult, in nights which are too dark for the very low margin of the Cape to be seen, to guard against an optical delusion, as to the distance of the vessel from the shore; and the error is most apt to be on the unsafe side; hence, vessels have often been suddenly run upon the Cape, which were supposed to be in mid-channel of the roadstead. The soundings give no indication of proximity, as bold water is found at the very edge of the shore.

2d. The necessity of a permanent Light-House on the lower end of the Brandywine Shoal.

The importance of a light on this position has been made evident to Congress, as appears by an appropriation for a floating light. But, though this floating light will, doubtless, answer all purposes during the greater part of the year, it is certain that it will be destroyed, unless removed at the approach of each season of floating ice; and hence, as that is the season of most violent gales, and of greatest damage, it will be away when perhaps most necessary.

The Commission do not hesitate, as to the practicability of fixing a permanent light-house, (which need be but 20 or 25 feet high,) on the point indicated. It is essential to remark here, that, at the period when the floating light will be removed from its station, all buoys, and other signals of sub-marine dangers, will, also, for the same reasons, be wanting to direct the navigator.

3d. The importance of having, without delay, a correct hydrographic chart, made of the whole bay and river.

Of all the navigable communications from the sea to the interior, within the United States, that up this bay and river is most intricate, and most beset with unseen dangers; and there is none, probably, more imperfectly known. The pilots, it is true, are acquainted with certain channels well enough to conduct vessels, at a favorable time, with safety; but it is far from certain that they know these thoroughly, or that these are the only or the best.

The great distance and small elevation of the shore, and the similarity in the soundings and composition of the shoals, make it very difficult at times, to hit or keep in the best water, even to the pilots. A chart of the bay and river, which would exhibit a true outline of the shores, with all the land marks, the courses and widths of the several channels; the set of the tides; the influence of the moon and of winds upon the rise of tide in different parts of the bay; the place, extent, and form, of all ledges, banks, and shoals; the soundings and

nature of the bottom, both on the shoals and in the channels; the harbors and anchorages; exact and perspicuous sailing directions, &c. &c.—such a chart would not only greatly add to the knowledge and utility of the pilots. but, with the help of proper signals, buoys, &c. would enable intelligent masters of vessels to enter with confidence upon the navigation, when, as sometimes happens in stress of weather, they could neither obtain pilots, nor keep the sea with safety.

It will not be out of place here, to advert to the facilities as to the pilotage of the bay, which will be afforded by the partial harbor. The pilots of Cape Henlopen are provided with pilot boats and whale boats; with the former they cruise in fine weather, sometimes out of sight of land; in bad weather, though some have been lost by pursuing their cruises too long, they retire to Lewistown behind the Cape Henlopen, and depend on signals at the Light-house, to inform them of the approach of vessels. On these signals being made, they start in the whale boats; but the distance is so great, that vessels are frequently in danger and sometimes lost, before they can board them. Anchored under cover of the partial breakwater, however, the pilots would be enabled to get to sea in time, with their largest class of boats, thereby materially diminishing the risk to the arriving vessels and to themselves.

All which is respectfully submitted.

BERNARD,

Brigadier General.

JOS. G. TOTTEN,

Maj. Eng. Br. Lt. Col.

WM. BAINBRIDGE,

United States' Navy.

Accompanying this Report there are three plans, viz.

A chart of part of Delaware Bay near Cape Henlopen.

Plan and profiles of a complete breakwater for the position B, near Cape Henlopen.

Plan and profile of a partial breakwater for the position A, near Cape Henlopen.

The foregoing is a true copy of the original on file in the Engineer Department.

ALEXANDER MACOMB,

Maj. Gen. Chief Engineer.

*Report of the Board of Engineers, for the improvement of the Harbor
of Erie.*

LIST OF DRAWINGS ACCOMPANYING THE REPORT.

1. Sketch of Lake Erie.
- 2, 3. Details of Dike, Embankments, and Piers.
4. A chart of Presque Isle Bay, (Erie Harbor.)
 To which is annexed,
5. An estimate on the supposition that the current will deepen
 the channel. And
6. An estimate on the supposition that dredging must be re-
 sorted to.

B.

*Brevet Major-General Alexander Macomb,
Colonel Commanding United States Engineers.*

NEW-YORK, October 4, 1823.

SIR: The board of Engineers, under orders of the 7th of May, 1823, have lately examined the harbor of Erie, Pennsylvania, with a view to its improvement, for the purposes of navigation, and they now submit the following

REPORT:

The harbor of Erie, or Presque Isle Bay, is formed by a sand-bank which makes out from the main shore, about four miles westwardly of the town of Erie. This sand-bank, near the shore, is narrow and low, and pursues about a N. E. direction: having advanced two miles into the Lake, it suddenly widens to two-thirds of a mile, but pursues the same direction for another mile, when it gradually increases in width to one mile, and gradually changes its direction to an eastern course, terminating north of the town of Erie in two narrow points, having a small and well enclosed harbor between them. The greater part of this sand-bank, (significantly called Presque Isle,) is covered with wood. The basin lying between this bank and the main, is about half a mile wide, and four miles long; a great part of it being deep enough even for frigates.

In continuation of Presque Isle, there is a *sand-bank under water*, nearly a mile wide, which runs in a S. E. direction to the shore of the main, a little eastward of the town of Erie, reducing the depth of water, in this part, (the mouth of the basin) to about six feet on the average. A narrow and winding channel runs through this bank, in which there is from five to nine feet of water.

It will be seen, by the above description, and by reference to the map herewith, that this secure and beautiful harbor is inaccessible, except to vessels of the lightest draught, and therefore of no great value, either to the trade of the town of Erie or to the commerce of the Lake; and it remains, now, to examine whether any expedient can be adopted, by which, at a reasonable expense, the draught of water over this bank or bar will be augmented.

The basin of Presque Isle is situated so far above the commencement of the falls into Lake Ontario, and in so wide a part of Lake Erie, that the current produced by the escape of water at the falls is here insensible: the only currents here observable being entirely

owing to the easterly or westerly winds. These latter currents have, however, sometimes considerable rapidity; and a curious fact appears in relation to the effect of these lake currents upon the waters of the basin, viz. that a strong current sets into the basin, in direct opposition to the westerly winds when they blow hard; and, conversely, a strong current sets out of the basin, in direct opposition to violent easterly winds; or, in other words, the current out of, or into, the basin, runs in a direction opposite both to the set of the lake current and the direction of the winds, whether easterly or westerly.

It is important to account for this, before proceeding further; and, in doing so, we refer to the sketch herewith, to make the matter more intelligible.

We first must suppose the surface of the lake, and of the basin, to be of the same level, as will always be the case, after a few days of calm weather, and represent this level by $0^{\circ} 0' :''$ and $0'''$. An easterly wind then setting in, drives a part of the water of the eastern half of the lake, into the western, raising the surface at $0''$ and $0'''$; and lowering it at $0'$; as the surface descends at $0'$, the water in the basin must also descend, by running out against the wind, there being no issue at the west end of the basin.

In like manner, when a westerly wind heaps the water at $0'$ above the surface in the basin, it must rise in the basin by running in against the wind, there being no entrance at the west end.

As the winds abate, the waters gradually take a level common to both lake and basin; but not the same as before, for, (the supply being nearly equable at all times,) with westerly winds, more is forced out of the lake over the falls, and with easterly winds less pass that way than when the surface is at a mean elevation. The basin has, therefore, higher to rise, immediately after an easterly wind, than it was depressed by it: and lower to fall, after a westerly wind, than it was elevated by that wind. But the return of the lake to its level is slow and gradual; the elevation and depression of the waters at its ends, is sudden and violent, and amounts often to several feet. It is to this latter operation, therefore, that we are to look for producing any considerable effect.

Having now become acquainted with the causes of the currents of the basin, and their operation, we will endeavor to ascertain if they can be turned to account in deepening the water on the bar, at the mouth of the basin.

Whether that bank is coeval with the Presque Isle in the form in which it now appears, or not, matters little, so long as we may safely infer, that its present state, being that in which it has always been known with little deviation, is owing to causes which are evident, and some of which can be in a measure controlled—these causes are the inertia of the matter composing it; the force of easterly winds and the strength of the basin currents.

Easterly winds, if preponderating over the resistance of the matter and the opposition of the current, would wear away this bank, and spread the sand over the interior of the basin. The basin currents,

but for the same resistance, would deposit part of the sand in the lake, and part in the basin. An equilibrium between the three, has, in all probability, determined the general form of the shoal; and with slight variations has maintained, and will still continue to maintain, the present form. The variations here alluded to, are due to the greater or less violence and frequency of easterly winds; and to the greater or less violence of the basin currents consequent upon westerly winds; or, in other words, to a difference of the seasons, and have no important bearing on the project before us. It is important to remember, that westerly winds can do little or nothing towards heaping up, or carrying away, sand at the mouth of the basin; as this month, with those winds, is under the lee of the Presque Isle.

On the considerations stated above, it seems obvious that no help can be derived from the current in clearing a navigable passage through the bar, unless its velocity can be considerably increased.

With a view to this increase of current, the Board propose to form two parallel embankments, separated 200 feet, from near Block-house Point to deep water in the lake; and, with the exception of this passage, to close the whole of the mouth of the basin, by a line of contiguous piles from Block-house Point to Hospital Point, terminating the embankment, in the lake, by two strong piers, each standing obliquely to the line of embankment with which it is connected; and in the basin, by placing the parts within the line of piles, also obliquely. The general direction of the currents will be the same after the construction of this work as before; but the force, it is presumed, will be sufficiently augmented, by the contraction of the passage, to sweep away not only the sand between the embankments, but also that which lies between the inner end of the artificial channel and deep water in the basin. Admitting the current to be adequate to that object, when not opposed by the wind; we will now see whether this opposition, or the action of the wind, in any respect, will be likely to prevent a profitable result from this project. Easterly winds will throw a heavy swell into and against the mouth of the artificial channel, and will doubtless prevent the waters, coming out with their load, from transporting it far into the lake; the sands brought out by the current when the winds are still, and dropped when the stream ceases to have sufficient velocity to bear them along, may, also, by these winds, be driven back; and thus a new bar be formed near the mouth: but, as the moving of the sand by this current will cease as soon as a certain depth is attained, (for the velocity will diminish as the depth increases, until at last the inertia of the matter will be in equilibrium with the velocity,) as a part will be carried into the basin, where winds will not disturb it: and as a part of that carried into the lake will be driven by the waves upon the shoal to the right and left of the channel, where it must remain, as there will no longer be a current over this shoal, it is presumed that the new bar cannot be of sufficient elevation to impede the navigation. Should, however, an impediment be raised by the action of the winds, there is reason to believe that it will be but temporary and of trifling

inconvenience; because easterly winds, which are rare, alone tend to form that bar, while the current which ensures the subsidence of that wind, and both the current resulting from westerly winds, which are the prevailing, will successively operate to remove it.

The Board have considered the habits of the waters of Lake Erie and Presque Isle Bay so peculiar and so different from those of rivers, where similar expedients are generally unavailing, as to justify the project which has been described above. But so difficult is it to foresee all the effects where such inconstant and powerful agents are to operate, that they might not have ventured to propose it, were it not a necessary part of the only plan which can be resorted to in the event of the augmented current failing to do, or to do thoroughly the work here assigned it.

Supposing then that the current is not found strong enough to clean out and narrow the passage, it will be necessary to continue the embankment inward to deep water, and to clear out the whole by dredging.

Should it be found that the current leaves a deposite in the channel, the line of piles must be drawn up or sawed off, when as but a small part of the waters will go through the channel, the deposition will be very inconsiderable.

It now remains to describe the project more in detail.

The dike from Hospital to Block-House Point, must be a single row of contiguous piles 25 feet in length, having their tops three feet above the surface of the water. The touching sides of the piles should be hewed.

Each embankment should be formed by first driving a row of contiguous piles, like the above, along the edge of the channel. A line of round timber should then be laid upon the sand at the distance of 12 feet towards the shore; from the line of piles, connecting these round timbers every 12 feet with the line of piles, by round tie-pieces morticed both to the piles and the timbers. Upon the first row of round timbers a second must be raised, connected to the line of piles in the same way (but to different piles) as the first, by similar tie-pieces. Then a third row of horizontal timbers, and so on until the line of horizontal timbers is even with, or a little above the surface. The line of timber being raised to the proper height and connected with the line of piles round, 25 feet piles should be driven every 16 feet, so as to bear against the inside of the line of horizontal timbers. Another row of round piles, about 15 inches diameter, and 25 feet long, should then be driven on the inside of the line of contiguous piles and bearing against it, as guard-piles, or fenders; these should be 16 feet apart and connected to each other at top by a 15 inch square cap-piece, morticed on; the height of the top of this cap-piece, and of the top of the line of contiguous piles, should be about 3 feet above the water. Rafters should then be laid every 4 feet morticed at one end into the cap-piece, and at the other into the upper horizontal timber. The space being then filled with brush and sand and

gravel, or, better still, with stones and gravel, the whole should be covered with two-inch planks, well fastened down to the rafters.

The piers at the extremities of the embankments should be made by driving contiguous piles all around, and connecting these with piles driven here and there in the enclosed space, filling the interior with stones and gravel. Guard or fender piles should be driven all around on the outside 10 feet apart and connected at top by a cap-piece, which should be well tied to the interior piles.

The distance between the two embankments is proposed to be 200 feet; but should dredging ultimately be necessary to clear the channel, the deepened part need be but 100 feet wide, which will leave a berm of 50 feet, or rather, as the sand would not stand at a steep slope, there would be a very gentle slope of 50 feet base on each side.

On reference to the drawings herewith, it will be seen that it is proposed to have 10 feet of water in the channel; and that from the length of the piles this depth may be made some feet greater without endangering the stability of the embankment. It will also be seen that the sand rests upon clay: this substance is rather mud than clay, and it is believed that, considering the depth at which it is supposed to lie on an average, the occurrence of this substance is fortunate for the project--whether the currents are made to effect the excavation or the dredging machine.

The direction of the present narrow channel seems to indicate that there is occasionally a current setting out of the small bay to the north of Block-House Point; indeed, that there is such a current at times is confidently asserted by some of the most intelligent observers of the habits of these waters. If such be the fact, it may be expected that the shoal to the north of the embankment will be deepened and a convenient outer harbor be formed there.

Little need be said in reference to the importance of having a good harbor in this part of Lake Erie. The rapid increase of population along the shores of this and the Superior lakes; the character of that population; the fertility of the soil; the connexion which this lake has with the communications, natural and artificial, extending, on one hand, into the depths of the wilderness, and, on the other, to the extremes and centre of the maritime frontier, all indicate that the present active and important commerce, well worthy, as it now is, of all solicitude, must greatly and rapidly augment. Excepting the basins of Erie and Sandusky, there is not a harbor of any capacity between Buffalo and the Islands; and these, as well as the smaller ones, are obstructed by bars, and have channels (shoal as they are) so intricate, that vessels, under stress of weather, can seldom resort to them for refuge. It often happens, that vessels, not being able to enter the harbor, either from too great a draught of water, or from the difficulty of working their way in, are driven back, by adverse winds, from one end of the lake to the other.

The importance of the harbor of Erie, for naval purposes, will depend upon the adoption of the policy of carrying on any future war with Canada, wholly, or in part, upon these upper lakes. Should

that policy prevail, or should the United States be driven to defensive measures, then, by the operations of the enemy, it will be of the first importance to have the water over the bar at Erie at least ten feet. The American squadron, during the late war, were obliged to cross this bar without their armaments. Had the enemy, then blockading, known the real depth on the bar, this squadron must have yielded without resistance.

Besides, even supposing that no naval operations were contemplated by this government, or provoked by the enemy, it would still be a matter of no small moment to maintain a sufficient naval force to protect the commerce of the lakes from the privateering of the enemy, which would otherwise cut off all communications between the lakes and the maritime frontier, by the way of the great western canal; and, if we confine our view to this description of naval force alone, the improvement of the harbor of Erie is obviously a matter of primary importance.

All which is respectfully submitted.

BERNARD,

Brigadier General.

JOS. G. TOTTEN,

Maj. Engr's. Bl. Lt. Col.

ENGINEER DEPARTMENT,

Topographical Office.

The foregoing report and the following estimate is a true copy of the original in the Engineer Department.

ALEX. MACOMB,

/ Maj. Gen. Chief Eng.

ESTIMATE—No. 1.

Of the quantities of materials and expense necessary for the construction of the projected Dikes, Embankments, and Piers, in the Harbor of Erie.

DIKE.

A Dike, constructed of piles, of 12 inches diameter, and 25 feet in length, (the touching sides being hewed.) Length of Dike, from Hospital Point to Block House Point, 950 yards. No. of piles 2850—2850 piles, at \$1 each, \$2,850 00

Total of the expenses for construction of
dike,

\$2,850 00

Carried forward,

EMBANKMENTS—*North side.**Brought forward,*

2,850 00

Contiguous piles, 12 inches diameter and 25 feet in length, the touching sides being hewed—length of embankment 826, 666 yards. Number of piles 2480—2480, at \$1 each,

2,480 00

Round timber, 12 inches diameter, and about 30 feet in length, to be laid horizontally, at the distance of 12 feet from the line of piles—average depth of water 7 feet $\frac{1}{10} \frac{1}{10}$ —length of embankment 826,666 yards. Number of piles 582—582 logs, at \$0 75 each,

436 50

Round tie-pieces, 6 inches diameter—morticed both to the piles and to the timber at every 12 feet, the mean depth of water being 7.131 feet. Number of piles 1,240—1240 round tie-pieces, at 25 cts. each.

310 00

Round piles, 15 inches diameter, and 25 feet in length, as guard piles for the inside line of contiguous piles, 16 ft. apart. Number of piles 155—155 round piles at \$1 each,

155 00

Round piles, 12 inches diameter, and 22 feet in length, as guard piles for the line of horizontal timbers, in the exterior of the embankment, 16 feet apart. Number of piles 155—155 round piles at \$1 each,

155 00

Cap pieces, 15 inches square, morticed in the guard piles, 24 feet in length. Number of pieces 104—104 cap pieces at \$1 50 each,

156 00

Rafters, 8 inches in diameter, hewed on upper side, 13 feet 8 inches in length, laid every 4 feet, morticed at one end into the cap piece, and at the other into the upper horizontal timber. Number of rafters 620—620 rafters at $37\frac{1}{2}$ cts. each,

232 50

Two inch planks, for the covering of the embankment, its width being 14 feet, its length 2480 feet. Square superficial

Carried forward,

<i>Brought forward,</i>		2,850 00
3857.77—3857.77 square yards, 2 inch plank, at 25 cts.	964 45	
<i>Total of expenses for the Northern side of the embankment,</i>	4,889 45	
<i>Total of expenses for the Southern side of the embankment,</i>	4,889 45	
<i>Total of the expenses for the Embankments,</i>		9,778 90
<i>NOTE</i> The two sides of the Embankments have been calculated on a mean depth of water, and give, consequently the same amount of materials and expenses.		\$12,628 90

PIERS.

For one pier, the mean depth of water being 18 feet.

Contiguous piles, 12 inches diameter, 25 feet in length, the touching sides being hewed. Number of piles, 300.—300 piles at \$1 each

Round piles, 15 inches in diameter, and about 25 feet in length, as guard piles, at every 10 feet. Number of them 30

Ditto in the interior of the pier, 16

—

46 piles at \$1 each, 46 00

Round piles, 12 inches in diameter, 25 feet in length, 10 feet apart, for the interior of the piers. Number of the piles 20—20 piles at \$1 each,

20 00

Round tie-pieces, 6 inches square, 16 feet in length, to connect the contiguous piles with the interior piles, 3 feet apart on the vertical plane, and at every 10 feet on the horizontal plane. Number of tie-pieces 174—174 tie-pieces at \$0 25 each,

43 50

Cap pieces 18 inches square, morticed on the guard piles, 25 feet in length. Number of them 12, at each, \$1 50

18 00

Ditto. do. do. 20 ft. No. 8, 1 50

12 00

Do. do. do. 21 ft. 3. in. No. 4, 1 50

6 00

Do. do. do. 12 ft. No. 4, 1 00

4 00

Do. do. do. 10 ft. No. 3, 1 00

3 00

Carried forward,

<i>Brought forward,</i>	12,628 90
Total of the expenses for the construction of one pier,	452 50
Total of the expenses for two piers of the same dimensions,	905 00
Total of the expenses for constructing the embankments and two piers,	<u>13,533 90</u>
Contingencies, at 10 per cent.	1,353 39
Total amount of Estimate, No. 1.	\$ 14,887 29

ESTIMATE—No. 2,

For the part of the Embankments continued inward, to deep water within the Basin.

EMBANKMENTS—North Side.

(1) Contiguous piles, 12 inches in diameter, 25 feet in length, the touching sides being hewed. Length of embankment 473,333 yards. Number of piles 1420, at \$1 each, \$ 1,420 00

(2) Round timbers, 12 inches diameter, about 30 feet in length, to be laid horizontally at the distance of 12 feet from the line of piles, the mean depth of water being 7 feet, length of embankment 473,333 yards. Number of logs 331, at 75 cts. each,

248 25

(3) Round tie pieces, 6 inches diameter, morticed both to the piles, and to the timber, for every 12 feet; mean depth of water 7 feet. Number of pieces 710, at 25 cts. each,

177 50

(4) Round piles, 15 inches diameter, 25 feet in length, as guard piles for the inside line of contiguous piles, 16 feet apart. Number of piles 89, at \$1 each,

89 00

(5) Round piles, 12 inches diameter, 22 feet in length, as guard piles for the line of horizontal timbers on the exterior of the embankment, 16 feet apart. Number of piles 89, at \$1 each,

89 00

(6) Cap pieces, 15 inches square, morticed on the guard piles, 24 ft. in length, Number of pieces 59, at \$1 50 each,

88 50

Carried forward,

Brought forward,

(7) Rafters, 8 inches diameter, hewed on the upper side, 13 feet 8 inches in length, laid every 4 feet, morticed at one end into the cap piece, and the other into the upper horizontal timbers. Number of rafters 355, at 37½ cts. each,

133 12½

(8) Two inch planks, for the covering of the embankment, 2,208.88 square yds. the width being 14 feet, at 25 cts. the square yard,

552 22

Total of the expenses of the Northern side,

\$ 2,797 59½

South Side.

(1) The elements given by the numbers (1), (4), (5), (6), (7), (8), of the north side, are the same for this side. The amount of their expenses consequently is

2,641 84½

(2) Round timbers 12 inches diameter, 30 feet in length, the mean depth of water being 8 $\frac{4}{10}$ feet.

621 75

Number of logs 829, at 75 cts. each,
(3) Round tie-pieces 6 inches diameter, morticed both to the piles and to the timber, for every 12 feet; mean depth of water being 8 $\frac{4}{10}$ feet.

94 75

Number of pieces 379, at 25 cts. each,
Total of the expenses of the Southern side,

\$ 3,058 54½

Total of the expenses of the embankment,

\$ 5,855 94

Amount of expenses for two piers (the dimensions as above) 100 feet by fifty feet,

905 00

Total,

6,760 94

Contingencies 10 per cent.

676 09

Total amount within the dike,

7,437 03

Total amount outside, as per Estimate Number 1.

14,887 29

Grand Total of expense of Dike, Piers, and Embankment,

\$ 22,324 32

Add for expense of clearing out the channel to the proposed depth of 10 feet,

4,361 50

Original cost of the dredging machine,

9,215 00

Total amount of Estimate Number 2,

\$ 35,900 82

RECAPITULATION.

ESTIMATE No. 1.—On the supposition that the current will deepen the channel	\$ 14,887 29
ESTIMATE No. 2.—On the supposition that the channel must be cleared by dredging	\$ 35,900 82

13

Report of the Ordnance Department, with Statements from A to E.

ORDNANCE DEPARTMENT,

November 21, 1823.

SIR : In compliance with your instructions of the 7th of April last, and of the 5th inst. I have the honor to communicate, herewith, the papers marked A, B, C, D, and E, containing the statements required, viz.

Statement A exhibits an account of the remittances, through this Department, in the year 1822; shewing the amount, under each head of appropriation, received by each disbursing officer; the amount of accounts rendered by them; and the balances remaining in the hands of each at the close of the year. By this statement, it appears, that the total amount of money expended through this Department, in the year 1822, was, \$698,467 16

The amount of accounts rendered and settled in
the same time, - - - - - 643,418 60

The balance remaining in the hands of disbursing officers, at the close of the year, was, - 55,048 56

and that the whole of this balance has been since accounted for—no instance of defalcation having occurred.

Statement B exhibits an account of the moneys transmitted to the several disbursing officers, at the armories and arsenals, during the three first quarters of the present year; the amount of the accounts rendered by them during the same period; and the balances remaining unexpended, in the hands of each, at the close of the third quarter.

By this statement, it appears, that the total amount of moneys transmitted, was, \$346,217 68

The amount of accounts rendered, - - - 339,983 93

The balances remaining unexpended at the close of the third quarter, in the hands of disbursing officers, \$6,263 75

The accounts of all the disbursing officers and agents of this Department, have been rendered up to the 30th of September last, and have been deposited in the Auditor's office, for settlement.

Statement C shews the number and description of arms and accoutrements procured, and of the expenditures made, under the act for arming and equipping the militia, during the first, second, and third quarters of the present year.

The arms procured under the act are as follows, viz.

Muskets,	- - -	9240
Rifles,	- - -	1542
Pistols,	- - -	3400
Total,		14,182

The amount drawn from the Treasury, on this account, is	\$171,845 92
Amount collected on account of advances,	<u>13,682 00</u>
	<u>\$185,527 92</u>

The amount collected on account of advances is a reimbursement of a part of the sums advanced to contractors several years past. No advances have been made upon any contracts, made by this Department, since the year eighteen hundred and nineteen.

In July last, an apportionment was made of the arms due to the several states and territories, under the above mentioned act, up to the close of the year eighteen hundred and twenty two. The arms apportioned, were those procured during the last seven years, and amounted to ninety four thousand stands. After deducting the partial deliveries which had been made on account, there remained due to the several states and territories, about sixty six thousand eight hundred stands, of which, about thirty six thousand stands have been transported and delivered. The remainder have either been delivered, or are in a due course of transmission, the reports of which have not yet been received. A doubt has arisen, whether the terms of the act authorized a distribution to the militia of the District of Columbia. The third section provides, that the arms shall be transmitted to the several states and territories, in proportions corresponding with the number of effective militia in each respectively, and that they shall be distributed under such rules and regulations as shall be prescribed by their respective legislatures. No such regulations have been established for the distribution of arms to the militia of the District, nor is there any executive officer, designated by law, to whom this Department can deliver them. Under these circumstances, the delivery has been suspended; and I take the liberty respectfully to suggest, that provision may be made by law, for furnishing, to the militia of the District the quota of arms which shall be due the, etc.

Statement D exhibits an account of the work done, and supplies procured, at the several armories and arsenals, from the first of October, 1822, to the thirtieth of September, 1823.

In addition to the particulars shown in this statement, much other business has been done, which cannot be exhibited in a tabular form : such as the repairs and preservation of the arsenals, workshops, and wharves; the enclosures and improvements of the public grounds, and

the preservation and improvement of the establishments, generally. Those objects have received due attention, and the condition of the public buildings, and other property, under the control of this Department, has been much improved, and is, generally, in a good state of preservation.

The work done under the appropriation for arsenals, and which is not embraced in the statement, is the following: At Frankford, Pa. an arsenal 100 feet by 36, three stories high; a store house 60 by 26 feet, two stories high; and two work shops, 45 by 26 feet, one story high; all of stone, with slate roofs, have been commenced, of which the store house and work shops have been completed, and the arsenal nearly finished. The interior of a building, for officer's quarters, formerly commenced, has also been completed. At Greenleaf's Point, D. C. two work shops, of brick, each 100 by 25 feet, one story high, have been commenced and completed. A substantial wall, 260 feet in length, connecting the buildings, has also been erected; and 6000 cubic yards of earth have been removed; 1400 feet of stone fence, enclosing the magazine, has also been built.

At Baton Rouge, the arsenal formerly commenced at that place has been entirely completed, and a substantial gun house, 110 by 45 feet, of brick, has been commenced, and some progress made. The establishment at that place has been so far completed, that the ordnance and ordnance stores, hitherto at New Orleans, (a considerable part of which were deposited in rented ware-houses,) have been removed to it.

At Watervliet, N. Y. five and three quarters acres of land, adjoining the public ground, and the New York Canal, have been purchased, and a substantial shed, 100 by 28 feet, has been erected.

Statement E show the quantity of ordnance and ordnance stores issued from the arsenals and depots, for the supply of the army and military posts, from the first of January to the thirtieth of September, eighteen hundred and twenty three.

In conclusion, I beg leave to observe, that, upon a review of the preceding statements, it will be seen, that about seven hundred thousand dollars was drawn from the Treasury, and remitted to the disbursing officers of this Department, and to contractors, during the year 1822, and that the whole amount has been regularly and promptly accounted for; and that about five hundred and eighteen thousand dollars have been remitted, in like manner, during the three first quarters of the present year, and that the accounts of all the disbursing officers have been rendered up to the close of the third quarter, which accounts for the expenditure of about five hundred and twelve thousand dollars, leaving a balance of only six thousand dollars unexpended, which is applicable to the expenses of the present quarter. No instance of defalcation, or of failure to render accounts promptly, having occurred during the period embraced by the statements. These satisfactory results show, that the present system of accountability has attained a high degree of perfection, and that it has answered the fullest expectations.

It may not be irrelevant to add, that there has been a steady progressive improvement, as respects both the number and quality of the arms procured. The product of the National Armories will, this year, exceed, by two thousand stands, that of any former year; and of a quality equal to any that have ever been manufactured in the country.

I have the honor to be, Sir,

Very respectfully, your obedient servant,

GEO. BOMFORD, *Lt. Col.*

On Ordnance duty.

The Hon. JOHN C. CALHOUN,

Secretary of War.

Ordnance I

NG AND NG THE	TOTAL REM]
30 58	194
-	183,
-	3,
00 00	7,8
-	1,8
10 00	2,9
-	2,80
00 00	9,72
00 00	6,52
-	1,15
6 00	4,998
-	200
-	10,992
-	108
-	898
-	6,000
-	5,490
-	8,000
0 51	247,610 5
7 09	\$698,467 1

ORDNANCE DEPA

No

It may not be irrelevant to add, that there has been a steady progressive improvement, as respects both the number and quality of the arms procured. The product of the National Armories will, this year, exceed, by two thousand stands, that of any former year; and of a quality equal to any that have ever been manufactured in the country.

I have the honor to be, Sir,

Very respectfully, your obedient servant,

GEO. BOMFORD, *Lt. Col.*

On Ordnance duty.

The Hon. JOHN C. CALHOUN,

Secretary of War.

A.

STATEMENT of the Money expended through the Ordnance Department, in the year 1822.

AMOUNT OF SUMS REMITTED, INCLUDING THE BALANCES IN THE HANDS OF AGENTS, ON THE FIRST OF JANUARY, 1822.

OFFICERS NAMES AND STATIONS.	APPROPRIATIONS.					TOTAL AMOUNT REMITTED.	AMOUNT EXPENDED AND ACCOUNTED FOR IN 1822.	BALANCES REMAINING UNEXPENDED IN THE HANDS OF DISBURSING OFFICERS, 31ST DECEMBER, 1822.	REMARKS.
	FOR NATIONAL ARMORIES.	FOR THE CURRENT EXPENSES OF THE ORDNANCE SERVICE.	FOR ARSENALS.	FOR CANNON, SHOT, SHELLS, &c.	FOR ARMING AND EQUIPPING THE MILITIA.				
John Chaffee, armory Springfield, Mass.	-	192,937 42	-	-	-	1,580 58	194,468 00	183,321 63	11,146 34
John P. McGuire, armory Harper's Ferry, Va.	-	183,553 34	-	-	-	-	183,553 34	157,184 89	26,368 45
Capt. D. T. Welsh, arsenal Watertown, Mass.	-	-	3,513 75	-	-	-	3,513 75	2,821 97	491 78
Major J. Dalliba, arsenal Watervliet, N. Y.	-	-	7,045 26	324 69	-	500 00	7,869 95	6,506 67	1,363 28
Lieut. A. Mackay and Lieut. J. Monroe, New-York	-	-	569 72	-	1,250 00	-	1,819 72	1,465 60	334 12
Lieut. M. Thomas, arsenal Frankford, Pa.	-	-	2,118 18	-	-	810 00	2,928 18	2,351 21	576 97
Lieut. N. Baden, arsenal Baltimore, Md.	-	1,010 61	1,790 86	-	-	-	2,801 47	2,712 79	88 68
Capt. George Talcott, Pittsburgh, Pa.	-	-	9,236 81	-	-	500 00	9,726 81	8,276 81	1,450 00
Lieut. J. Simonson, Greenleaf's Point	-	-	2,427 81	-	3,600 00	500 00	6,527 81	4,922 39	1,705 42
Capt. R. L. Baker, Richmond, Va.	-	-	1,159 77	-	-	-	1,159 77	802 34	297 43
Capt. H. K. Craig, Augusta, Geo.	-	-	4,295 92	226 52	-	476 00	4,998 44	4,287 49	710 95
Lieut. J. A. Adams, New Orleans	-	-	200 00	-	-	-	200 00	-	200 00
Lieut. J. Symington, Baton Rouge	-	-	600 00	10,392 32	-	-	10,992 32	8,949 55	2,042 77
J. Whistler, M. S. K. Belle Fontaine	-	-	108 22	-	-	-	108 22	54 53	53 69
S. Perkins, M. S. K. Detroit	-	-	898 42	-	-	-	898 42	679 74	218 68
R. L. Stevens, for elongated shells	-	-	-	-	6,000 00	-	6,000 00	6,000 00	-
J. Clark and Co. for shot and shells	-	-	-	-	5,490 45	-	5,490 45	5,490 45	-
Jno. Mason, for cannon, howitzers, &c.	-	-	-	-	8,000 00	-	8,000 00	-	8,000 00
Sundry contractors for small arms	-	-	-	-	-	247,610 51	247,610 51	247,610 51	-
Total	-	\$377,501 37	\$33,754 72	\$10,943 53	\$24,340 45	\$251,927 09	\$698,467 16	\$643,418 60	\$55,048 56

ORDNANCE DEPARTMENT,

November 21st, 1823.

GEO. BOMFORD, Lt. Col.

On Ordnance Duty.

Payments due on audited accounts.

Do do

Accounted for, third quarter 1823.

Payments due on audited accounts.

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nals of the United States, from first
from each during the same period.

Amount transmitted in the 1st, 2d, & 3d quarters of 1823.	Total amount.	Am't of accounts rendered in the 1st, 2d, and 3d quarters of 1823.	Balances remaining in Officers' hands 1st Oct. 1823.
129,019 00	140,165 34	138,999 77	1,165 57
120,000 00	146,368 45	144,868 45	1,500 00
2,300 00	2,791 78	2,443 15	348 63
7,040 00	8,403 28	8,160 83	242 45
750 00	1,084 12	1,084 12	
16,059 32	16,636 29	16,546 57	89 72
1,977 42	2,066 10	2,025 62	40 48
6,775 45	8,225 45	8,074 94	150 51
7,000 00	8,705 42	6,955 83	1,749 59
600 00	897 43	639 37	258 06
2,045 67	2,756 62	2,656 68	99 94
-	2,042 77	2,042 77	
-	53 69	46 19	7 50
-	218 68	218 68	
1,200 00	1,400 00	818 70	581 30
4,402 26	4,402 26	4,402 26	
299,169 12	346,217 68	339,983 93	6,233 75

r. November 21st, 1823.

G. BOMFORD,

Lieut. Col. on Ordnance duty.

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B.

STATEMENT of Funds transmitted to the several Armories and Arsenals of the United States, from first January to 30th September, 1823, and the amount of accounts rendered from each during the same period.

OFFICERS NAMES AND STATIONS.		Amount in Officers' hands 1st Jan. 1823,	Amount transmitted in the 1st, 2d, & 3d quarters of 1823.	Total amount.	Amt'of accounts rendered in the 1st, 2d, and 3d quarters of 1823.	Balances remaining in Officers' hands 1st Oct. 1823.
John Chaffee.	Armory, Springfield, Mass.	\$11,146 34	129,019 00	140,165 34	138,999 77	1,165 57
John P. McGuire and William P. Craighill.	Do. Harper's Ferry, Vir.	26,368 45	120,000 00	146,368 45	144,868 45	1,500 00
Captain D. T. Welsh and Lieutenant J. W. Thompson.	Arsenal, Watertown, Mass.	491 78	2,300 00	2,791 78	2,443 15	348 63
Major J. Dalliba and Lieutenant A. Lowd.	Do. Watervliet, N. Y.	1,363 28	7,040 00	8,403 28	8,160 83	942 45
Lieutenant James Monroe.	Do. New York.	334 12	750 00	1,084 12	1,084 12	
Lieutenant M. Thomas.	Do. Frankford, Pa.	576 97	16,059 32	16,636 29	16,546 57	89 72
Lieutenant N. Baden.	Do. near Baltimore, Md.	88 68	1,977 42	2,066 10	2,025 62	40 48
Captain G. Talcott and Lieutenant G. S. Drane.	Do. Pittsburg, Pa.	1,450 00	6,775 45	8,225 45	8,074 94	150 51
Lieutenant J. Simonson and Lieutenant W. E. Williams.	Do. Greenleaf's Point.	1,705 42	7,000 00	8,705 42	6,955 83	1,749 59
Captain R. L. Baker and Lieutenant T. I. Baird.	Do. near Richmond, Va.	297 43	600 00	897 43	639 37	258 06
Captain H. K. Craig and Captain A. Mackay.	Do. Augusta, Geo.	710 95	2,045 67	2,756 62	2,656 68	99 94
Lieutenant J. Symington and Lieutenant J. A. Adams.	Do. Baton Rouge, Lou.	2,042 77	-	2,042 77	2,042 77	
J. Whistler.	Depot, Belle Fontaine,	53 69	-	53 69	46 19	7 50
S. Perkins.	Arsenal, Detroit, M. T.	218 68	-	218 68	218 68	
Lieutenant J. A. Adams.	Depot, New Orleans,	200 00	1,200 00	1,400 00	818 70	581 30
Sundry persons, for balances due on settlements.		-	4,402 26	4,402 26	4,402 26	
	Total,	\$47,048 56	299,169 12	346,917 68	339,983 93	6,233 75

ORDNANCE DEPARTMENT. November 21st, 1823.

G. BOMFORD,*Lieut. Col. on Ordnance duty.*

C.

STATEMENT of the Arms and Accoutrements procured, and of the expenditures made, under the Act of 1808, for arming and equipping the Militia; from 1st January to the 30th September, 1823.

ARMS AND ACCOUTREMENTS PROCURED.

Muskets.	Rifles.	Pistols.	Flints.	24 pounder spherical case shot.	12 pounder do.	Rifle Accoutrements complete.	Sabre Belts.	Rifle Accoutrements without Flasks.
9,240	1,542	3,400	24,000	2,717	1,472	600	823	550

EXPENDITURES, viz.

Amount paid for the Arms and Accoutrements procured,	- - - - -	\$ 166,307 13
Amount paid for inspection, packing boxes, storeage, and distribution to the respective states,	- - - - -	5,538 79
Total amount drawn from the Treasury,	- - - - -	\$ 171,845 92
Amount collected from Contractors, on account of former advances,	- - - - -	18,682
Total value of Arms and Accoutrements procured, at contract price,	- - - - -	\$ 185,527 92

ORDNANCE DEPARTMENT,

November 21st, 1823,

GEO. BOMFORD,
Lieut. Col. on Ordnance duty.

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The 30th September, 1823.

November 21, 1823.

MORGE BOMFORD, Lt. Col. on Ordnance Duty.

D.

Statement of work done, and supplies procured, at each of the Armories and Arsenals of the United States, from the 1st October, 1822, to the 30th September, 1823

ORDNANCE DEPARTMENT, November 24, 1823.

GEORGE BOMFORD, Lt. Col. on Ordnance Duty.



E.

other Ordnanced States, from 1st
tember, 1823.

terms.	12 pounder Cannon.		
spikes.	12	12 pounder travelling Carriages, with im- plements complete.	
er belts, complete.	636	6 pounder case shot.	
ter funnels.	700	6 pounder round shot.	
	50	Ruzzes men.	
assorted.	135	Port fires.	
ets.	2,065	Tubes.	
es & froes,	41	Sponges & rammers.	
assorted.	10	Lead aprons.	



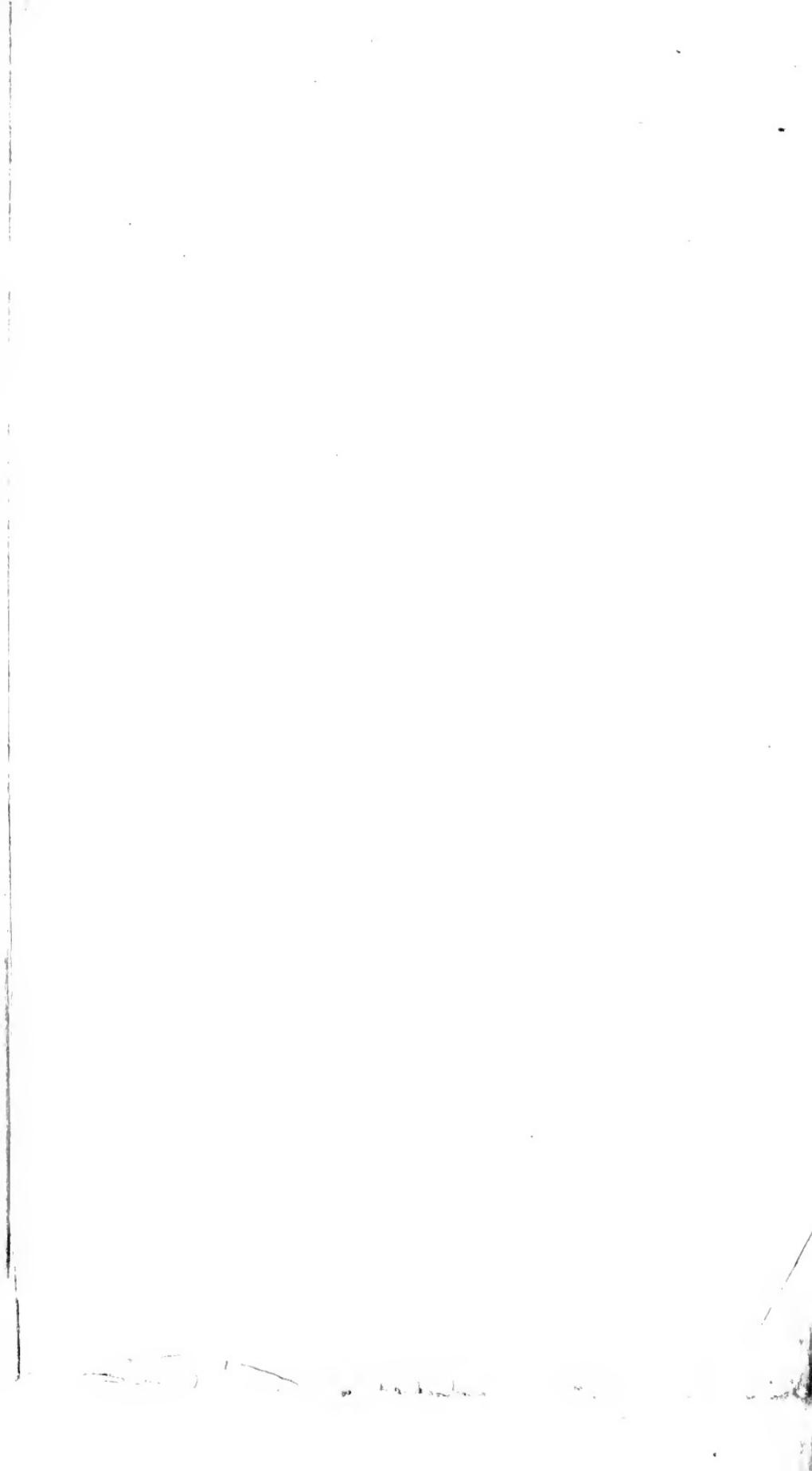
E.

STATEMENT of the Artillery, Small arms, and Accoutrements, and other Ordnance Stores, issued to the Troops of the United States, from 1st January to 30th September, 1823.

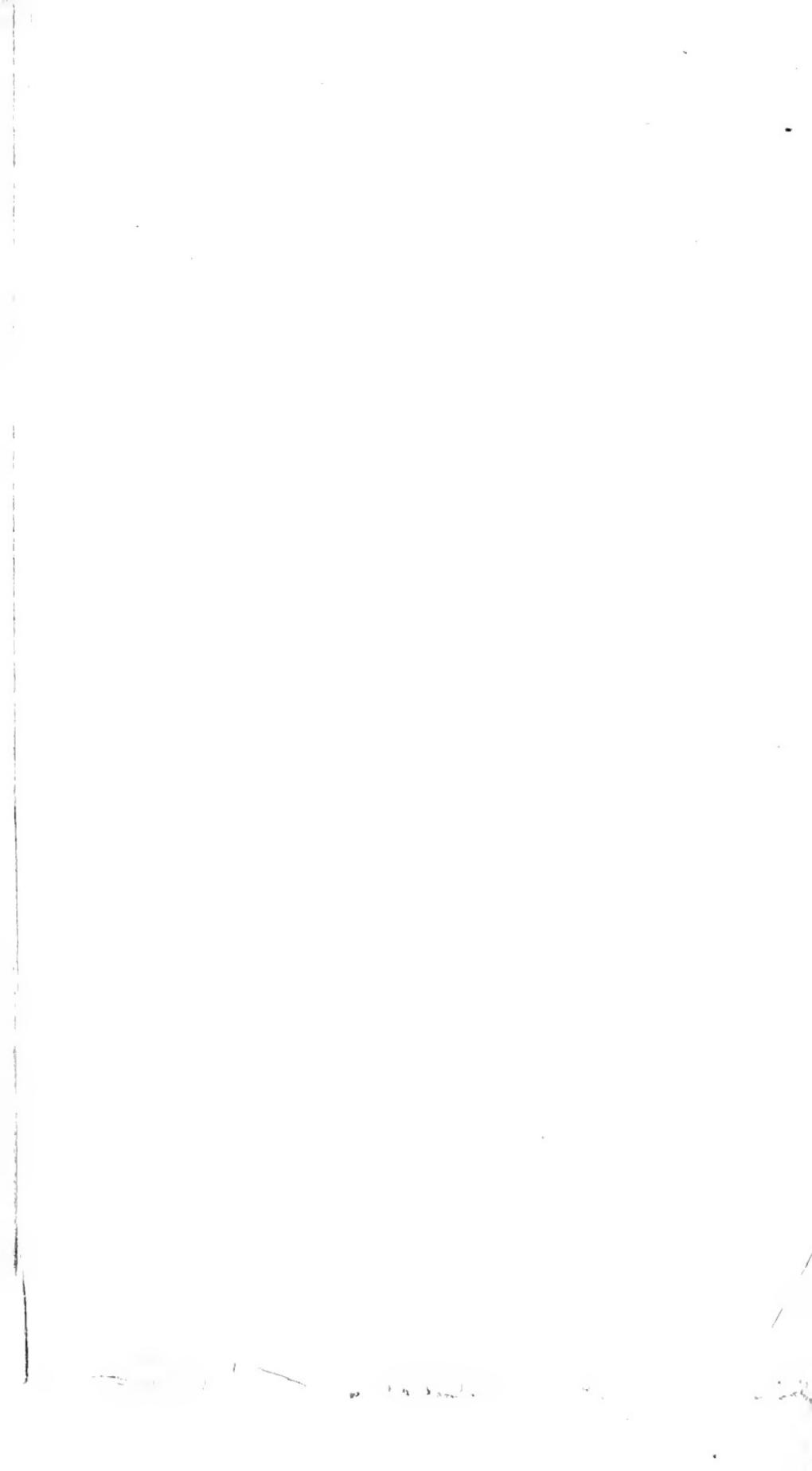
1	Sawed lead line.	12	Abras.,	5	Vanquishers,	1,144	Miner's complete.
2	Sand paper, quire.	12	Iron squares,	45	Gunner's harverisks,	970	Carton h. horse.
3	Twine, lbs.	5	Campuse's bars,	7	Linoleum, &c.	990	Dn. and B. L.
4	Tacks, large, lbs.	12	Drawing knifes,	6	Port fire sticks,	900	Bayonet scabbards,
5	Sides of leather.	10	Hannucks, assorted.	48	Brioks,	900	Dn. belts.
6	Anvils,	12	Spoke Shaws,	30	Buckets, Tar, and Sponge,	540	Breast plates.
7	Smiths' yellows,	54	Gimlets assorted.	13	Powder horns,	10	Sergeant's swords.
8	Do. Jongs, pairs.	26	Plaues do.	6	Pruning wires,	10	Sword belts.
9	Litharge, lbs.	12	Augers do.	6	Ammunition boxes,	255	Brushes & wires.
10	Putty, lbs.	4	Giltels do.	60	Slow match lbs.	79	Screw drivers.
11	White lead ground in oil, lbs.	20	Gouges, sets do.	20	Thumb stabs,	43	Ball screws.
12	Lamp oil, lbs.	700	Screw drivers,	6	Prolongs,	6	Spring vices.
13	Whiting, lbs.	4	Saw sets,	7	Port fire cases,	125,606	Musket cartridges.
14	Linsed oil, gallons.	6	Oil stones,	4	Tube boxes,	23,740	Flints.
15	Spirits turpentine do.	2	Clink lines,	11	Cartridge thread, lbs.	6	6 pounder Iron Cannon.
16	Paint brushes,assorted.	12	Spiritual oil do.	2	Sponge skins,	6	6 pounder travelling Carriages.
17	Lather, gallons.	40	Grind stones,	2	Port fire cutters,	12	12 pdr. Iron Cannon, mounted on fixed Carriages.
18	Sperm. oil do.	10	Files assorted.	6	Lanterns, —	12	12 pounder Iron Cannon.
19	Olive oil, do.	7	Raps do.	8	Handspikes,	12	12 pounder travelling Carriages, with in- plements complete.
20	Neatsfoot oil do.	6	Vices, hand & smiths ¹ .	1	Gunner belts, complete,	636	6 pounder case shot.
21	Brace & bits.	18	Screw plates,	10	Powder funnels,	700	6 pounder round shot.
22	Planks, feet.	1,620	Standing, feet.	3	Worms and lades.	100	12 pounder QD.
23	Needles.	7,000	Shears, pairs,	10	Budge barrels,	200	12 pounder strap shot.
24	Scissors, pairs.	23	Powder measures,	3	Powder measures,	200	12 pounder case do.
25	Knives	9	Axes, felling,	214	Axes, felling,	200	24 pounder shells.
26	Tacks, sponge.	7,000	Do. pick.	6	Do. pick.	710	6 pounder flange cartridges.
27	Chalk, lbs.	14	Gloves, lbs.	18	Shovels,	3,310	Cannon powder, lbs.
28	Steel, lbs.	24	Steel, lbs.	13	Brooms,	310	Musket do. lbs.
29	Bar Iron, lbs.	50	Spades,	196	Wheel barrows,	84	Cartridges, bayler, reams.
30	Pit coat, chaldrons,	12	Gle, lbs.	—	Iron crow bars.	350	Fuzes filed.
31	Soldering Irons.	1	Tryng squares,	4	Axes assorted,	135	Port fires.
32	Soldier, lbs.	12	Tryng squares,	5	Hatchets,	2,065	Tubes.
33	Borax, lbs.	1	—	—	Wedges & true's.	41	Sponges & rammers.
34	—	—	—	—	Lead aprons.	10	Lead aprons.

ORDNANCE DEPARTMENT, November 21st, 1823.

GEO. BOMFORD, Lt. Col. on Ordnance duty.







STATEMENT shewing the number of Pensioners placed on the rolls of the several States and Territories of the United States, in the year 1823, up to the 31st of October, and the total number inscribed thereon; distinguishing between the Revolutionary, Invalid, and half-pay Pensioners.

States and Territories.	Number of Pensions granted between the 1st of January and 31st of October, 1823,				Total number of Pensions granted.			
	Under the acts of the 18th of March, 1819, & 1st May, 1820.	Under the act of the 1st of March, 1823.	Under the several acts concerning invalids.	Under the acts of the 15th of April, 1816.	Under the acts of 1818, 1st March, 1820, and 1st of March, 1823.	Under the acts of 1818, 1st March, 1823, and 1st of April, 1823.	Under the acts of 1818, 1st March, 1820, and 1st of March, 1823.	Under the second section of the act of April, 1816.
Maine	12	58	5	-	1,208	58	96	7
New Hampshire	9	68	5	-	836	58	194	6
Massachusetts	10	55	2	-	1,677	53	403	24
Connecticut	4	62	2	-	839	39	181	17
Rhode Island	6	7	-	-	945	7	22	7
Vermont	14	50	1	-	1,000	50	176	10
New York	54	70	10	-	2,948	70	1,908	46
New Jersey	4	16	-	-	433	16	56	3
Pennsylvania	33	12	3	4	947	12	401	31
Delaware	1	-	2	-	27	-	18	1
Maryland	3	2	2	-	292	2	275	8
Virginia	25	4	1	-	667	4	233	17
North Carolina	14	1	-	-	236	1	84	6
South Carolina	4	1	1	-	111	1	20	1
Georgia	6	1	-	-	42	1	24	3
Kentucky	-	-	6	-	452	5	151	6
East Tennessee	5	2	1	1	96	2	30	5
West Tennessee	-	10	2	-	111	2	99	8
Ohio	13	10	8	-	661	10	150	-
Louisiana	-	-	1	-	3	-	21	-
Indiana	2	3	1	-	-	3	53	-
Alabama	-	-	-	-	-	-	15	-
Missouri	2	-	7	-	-	9	38	-
Mississippi	-	-	-	-	-	-	7	-
Michigan	1	-	3	-	-	8	19	-
Illinois	-	-	1	-	-	14	25	1
Columbia	-	-	-	-	-	38	69	2
	246	394	59	2	12,961	594	3,870	214

The following is the total amount of funds transmitted to the agents for paying pensioners for the year 1823, viz.

To pay Revolutionary Pensioners	-	-	-	\$ 1,339,178 38
Invalid Pensioners	-	-	-	301,015 15
Pensioners who receive half-pay in lieu of bounty lands	-	-	-	8,934
Aggregate				\$ 1,649,197 53

The foregoing statement is correct, and is respectfully submitted to the Secretary of War by his obedient servant,

J. L. EDWARDS.

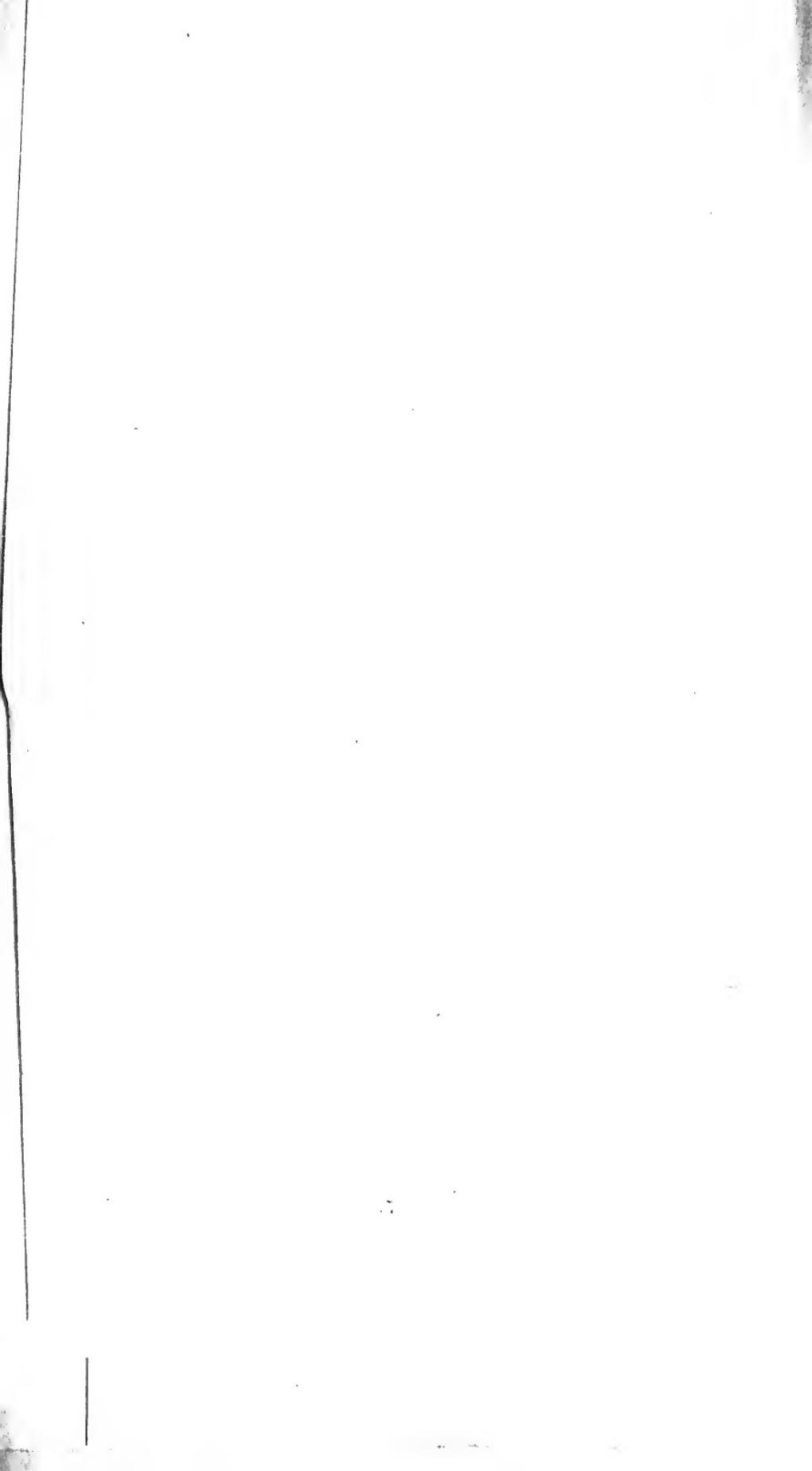
WAR DEPARTMENT, PENSION OFFICE,

November 25th, 1823.

—) 1 —

• 148 •

13





ABSTRACT of the number of Warrants for Military Bounty-Land, in virtue of service in the late War, issued under authority of the several Laws to that effect, up to the 30th of September, 1823, inclusive, viz.

1st. Act of Dec. 24th, 1811 and Jan. 11th, 1812, } 2nd. Ditto Dec. 10th, 1814. 3rd. Ditto Feb. 6th, 1812. (Volunteers,) } 4th. Ditto Mar. 5th, 1816. Canadian Voltm. (Diff. proportions according to grade.) }	(160 acres each.) " (320 " each.) " (160 " each.) Total, <u>26,549</u> acres.	25,145 1,009 127 268
Whereof 25,872 (1st and 3rd classes,) at 160 acres, amounts to 1,009 (2nd do,) at 320 " "	4,043,550 acres. 320,880	

N. B. In the class of "Canadian Volunteers," Bounty-Land was granted to officers as well as Privates, and in different portions: the aggregate quantity granted to this class, (No. 4.)

74,030	Total, <u>4,440,432</u> acres
--------	-------------------------------

RETURN of Claims, *included* in the above Statement, which have been deposited in the "Section of Bounty-Lands, War Department," within the *Three Quarters* of the present year, viz: from January 1st, 1823, to the 30th of September, inclusive, viz:

At the termination of the preceding Quarter, there remained on *File*, awaiting further Evidence,
New cases entered between January 1st, and September 30th, inclusive,

" Aggregate Num. 936 cases.

Whereof, the number admitted, for which warrants immediately issued,
" do. returned to the applicants for further evidence, or
" do. rejected, " "
" do. remaining to be acted on, " "
" do. there still remains on *File*, suspended, awaiting further evidence, 606
936

During the same Three Quarters, i. e. from January 1st to September 30th, 1823, inclusive, the class of claims for Military Bounty-Land, on account of services in the *Revolutionary War*, stands thus, viz:

At the termination of the preceding quarter, the number of cases on file, awaiting investigation, was,

Number of new applications during these *Three Quarters*,
Land Office, shall have been completed,

101	Total, <u>393</u>
294	
355	

Whereof, the number found satisfied long since,
" do. " admissible,
" do. " inadmissible and definitively rejected,
" do. " deficient in some points, and requiring further evidence;
and are suspended until an Examination of Locations, now in progress at the General Land Office,

The Class of "Canadian Voltm." claims remains *in statu quo*, excepting that, of the 169 cases so long since suspended, the Hon. Mr. Chandler has acquired satisfactory evidence that 35 claims, from the State of Maine, were *fraudulent*.

All which is respectfully submitted.

N. A. T. CUTTING, Clerk.



K.

Statement shewing the amount of Moneys advanced, and the amount accounted for, from the 1st of January, 1822, to the 31st of December, 1822, and from the 1st of January, 1823, to the 1st of September, 1823, on account of the Indian Department.

From 1st January to 31st December, 1822.				From 1st January to 1st September, 1823.			
Contingencies of Indian Department				Contingencies of Indian Department—Amount advanced			
	Amount accounted for		\$166,406 96				\$57,779 23
			159,321 02				44,506 35
			<u><u>\$7,085 94</u></u>				<u><u>\$13,272 88</u></u>
Annuities advanced	Amount accounted for		\$155,225 00				\$178,174 55
			130,025 00				135,659 62
			<u><u>\$25,200 00</u></u>				<u><u>\$42,514 93</u></u>
Pay of Indian Agents	Amount accounted for		\$23,225 86				\$14,883 33
			22,142 53				12,858 33
			<u><u>\$1,083 33</u></u>				<u><u>\$2,025 00</u></u>
Pay of Sub-Agents	Amount accounted for		\$9,941 66				\$7,755 29
			9,524 99				6,333 53
			<u><u>\$416 67</u></u>				<u><u>\$1,421 96</u></u>
Presents for Indians	Amount accounted for		\$12,198 09				\$7,642 00
			12,048 09				7,422 00
			<u><u>\$150 00</u></u>				<u><u>\$220 00</u></u>
Civilization of Indians—amount advanced	Amount accounted for		\$6,904 16				\$8,381 17
			981 99				3,459 00
			<u><u>\$5,922 17</u></u>				<u><u>\$4,922 17</u></u>
RECAPITULATION FOR 1822.							
Total amount of advances	Amount accounted for		\$383,901 73				\$274,615 57
			334,043 62				210,238 63
	To be accounted for		<u><u>\$49,858 11</u></u>				<u><u>\$64,376 94</u></u>
RECAPITULATION FOR 1823.							
Total amount of Requisitions drawn	Amount accounted for						
	To be accounted for						

SECOND AUDITOR'S OFFICE, 29th November, 1823.

WILLIAM LEE.



L.

CORRESPONDENCE

Relative to Hostilities of the Arickaree Indians.

Copy of the Licence granted to General William H. Ashley to trade with Indians up the Missouri, dated April 11, 1823.

To all who shall see these presents, Greeting:

Whereas William H. Ashley, of the state of Missouri, having made application to the Department of War, for license to carry on trade with the Indians up the Missouri, and hath given bond, according to law, for the true and faithful observance, by him and his agents, of all and singular the regulations and restrictions as are, or shall be made, for the government of trade and intercourse with the Indian tribes: Now, therefore, be it known, that the said William H. Ashley is hereby licensed to carry on trade with the Indians up the Missouri accordingly, for the term of one year from the date hereof, unless the licence hereby granted should be sooner revoked.

[L. S.] Given under my hand, and the seal of the War Office
of the United States, at the City of Washington, this
11th day of April, in the year of our Lord 1822.

By order of the President of the United States :

J. C. CALHOUN.

NOTE. A licence of precisely the same tenor and date was also granted to Major Andrew Henry.

*Extract of a letter from the Secretary of War to Gen. William Clark,
Superintendent of Indian Affairs, St. Louis, dated July 1st, 1822.*

I have received a letter from Major O'Fallon, in which he states that he understands a licence has been granted to General Ashley and Major Henry, to trade, trap, and hunt, on the Upper Missouri, and expresses a hope that limits have been prescribed to their trapping and hunting on Indian lands, as, he says, nothing is better calculated to alarm and disturb the harmony so happily existing between us and the Indians in the vicinity of the Council Bluffs.

The licence which has been granted by this department, by order of the President, to General Ashley and Major Henry, confers the privilege of trading with the Indians only, as the laws regulating trade and intercourse with the Indian tribes do not contain any authority to issue licenses for any other purpose. The privilege thus granted to them they are to exercise conformably to the laws and regulations that are or shall be made for the government of trade and intercourse with the Indians, for the true and faithful observance of which they have given bonds with sufficient security; consequently, it is presumed they will do no act not authorized by such laws and regulations, which would disturb the peace and harmony existing between the government and the Indians on the Missouri, but rather endeavor, by their regular and conciliatory conduct, to strengthen and confirm them.

General Gaines to the Secretary of War.

HEAD QUARTERS, WESTERN DEPARTMENT,

Louisville, Ky. July 28, 1823.

SIR : By the last mail I reported to the General in Chief, the information which I had received since the date of General Atkinson's communications upon the subject of the late hostilities of the Ricaras and other Indian nations of the Missouri river; together with the measures which I had taken to support the sixth infantry, and to restore peace.

Deeming it very important to the service, that the subject should be submitted to you without delay, I take this occasion, (to guard against a failure, such as appears to have attended two of my letters to the General in Chief, one of March 13, and the other of May 15,) to enclose, herewith, copies of my letters and instructions upon the subject of these hostilities, viz :

No. 1. Letter to Major General Brown, with two enclosures from Major O'Fallon and Major Foster, marked A No. 2, and B No. 1.

No. 2. Letter of instructions to General Atkinson.

No. 3. Letter of instructions to Colonel Chambers.

Should many of the Upper Missouri Indians unite with the Ricaras, and there is reason to apprehend that their old friends and allies, the Pawnees, and other nations, or at least the disorderly warriors of other nations, will unite against us in the event of their being able to compel Colonel Leavenworth to retrace his steps, without inflicting on them the chastisement which they merit; it may, in that case, be necessary to order up the fourth infantry, and to unite with it two or three battalions of volunteer mounted riflemen, which I have no doubt could be promptly obtained in this state, or in Tennessee, or perhaps in Missouri. Upon this subject, I have to request provisional instructions, in time to enable me to profit by the mild season of October and November, to move the 4th infantry to Council Bluffs, or at least to Fort Osage, for the winter; and to assemble the remaining part of the proposed force, in time to commence active operations against the Indians as soon in the spring as the weather will permit. In this case, I shall take the immediate charge of the expedition.

I feel persuaded, however, that, should the Ricaras venture to remain within their fortified village until the arrival of Colonel Leavenworth, he will, with his artillery, dislodge them; and he may, in this case, occasion a panic which may tend to disperse their allies, and to reduce them to submission. The supposed strength and fide-

lity of the Sioux, who were expected to accompany Colonel Leavenworth, afford some ground to anticipate this favorable result. But auxiliaries of this description are but little to be relied on, without they are accompanied by a force sufficient to restrain, or, if necessary, to coerce them, and without ample supplies of subsistence, and of clothing, blankets, &c. to present to them.

The 4th infantry being more entirely a disposal corps, and at this time the most efficient, I should have ordered it to Council Bluffs instead of the 1st, had it been a few weeks earlier in the season. But it is already too late even for the 1st to be pushed far beyond the Bluffs, before the approach of winter. Nor is it intended to send the disposable force placed under General Atkinson, beyond the Bluffs, in the present year, unless some unforeseen casualty or disaster on the part of Colonel Leavenworth's command, should require a rapid movement to sustain or relieve him; or unless the spirit of hostility should have extended itself to the Pawnees, or to some other tribes near to the Bluffs. In either of these events, General Atkinson will be actively employed against the enemy during the month of November next; and, should the early part of the winter be mild, as it sometimes has been, even in that region of open prairie, wind, and frost, he will have it in his power to give to his hostile neighbors sufficient annoyance, at least, to keep them on the alert, and deprive them of the comforts of permanent winter quarters.

I am convinced, from what you have repeatedly said and written upon the subject of our western Indian relations, that I need not to point out to you the evils that must inevitably result from our being compelled to recede from the position we have taken, and give up our trade and intercourse with those numerous nations. The trade itself, however valuable, is relatively little or nothing when compared with the decided advantages of that harmonious influence and control which is acquired and preserved, in a great degree, if not wholly, by the constant friendly intercourse which the trade necessarily affords, and by which it is principally cherished and preserved. If we quietly give up this trade, we shall at once throw it, and with it the friendship and physical power of near 30,000 warriors, into the arms of England;—who has taught us, in letters of blood, (which we have had the magnanimity to forgive, but which it would be treason to forget,) that this trade forms *rein* and *curb* by which the turbulent and towering spirit of these lords of the forest can alone be governed—I say *alone*, because I am decidedly of the opinion that, if there existed no such rivalship in the trade as that of the English, with which we have always been obliged to contend under the disadvantage of restrictions such as have never been imposed upon our rival adversary, we should, with one-tenth of the force and expense to which we have been subjected, preserve the relations of peace with these Indians more effectually than they have been at any former period. But to suffer outrages, such as have been perpetrated by the Ricaras and Blackfoot Indians, to go unpunished, would be to surrender the trade, and, with it, our strong hold upon the Indians, to England.

I have but recently recovered from an attack of bilious fever, and my hand is not yet steady enough to write with ease, or very legibly.
With great respect, I have, &c. &c.

E. P. GAINES,

Major General by brevet commanding, &c.

Hon. J. C. CALHOUN,
Secretary of War.

No. 1.

HEAD QUARTERS, WESTERN DEPARTMENT,
Louisville, Kentucky, July 26, 1823.

GENERAL: The report made to you the 12th instant, by General Atkinson, that General Ashley, with his trading company, had been attacked by the Ricaras Indians, and defeated, with the loss of 14 killed and 9 wounded, is confirmed by letters received last night from Major O'Fallon and Major Foster, of which I enclose herewith copies numbered 1 and 2. From Major O'Fallon's letter, you will perceive that other outrages, of a similar character, have been committed by the Blackfoot Indians, who have killed Messrs. Jones and Immel, (late an officer of the army,) with five other persons.

It appears, on the 22d of last month, Colonel Leavenworth marched with 220 regular troops, and 80 men of the trading companies, to be joined by a large party of Sioux warriors, against the Ricaras, who, being strongly fortified, the Colonel took with him some cannon.

The Ricaras Villages are situated about 700 miles above Council Bluffs, and are supposed to contain about 600 or 700 warriors; should they be able to turn out 600 warriors well armed, and, united as they are reported to be, the movement of Colonel Leavenworth, taking into view the great distance, and the several intermediate nations near which he must necessarily pass, cannot but be considered as very hazardous; and, as any disaster on our part would be witnessed, or very soon heard of by the numerous adjacent nations of Indians, a repulse, attended with the loss of but a few lives, would be to us a serious disaster, as it would tend to undo most of what has been done by the United States on the minds of the Indians, since the first occupancy of the posts up the Missouri.

The unprovoked outrages of the Ricaras call for exemplary punishment; but a premature effort, on our part, will but widen the breach between us, and enhance the evil we thus attempt to correct. I trust the report of Col. Leavenworth, which is not yet received, will give a more satisfactory view of his measures and prospects of success, than I am at present able to afford. I have, however, great confidence in the discretion and conduct of that officer, and I am persua-

ded that the circumstances of the case justified the step which he has taken. But, be this as it may, the step is taken, and therefore, the force engaged must be supported.

For this purpose, I have ordered General Atkinson to repair to the Missouri, where I have directed six companies of the first, and four of the seventh infantry, to be placed under his orders, which, with the disposable part of the 6th, he will be able, not only to support Col. Leavenworth, but to punish the Ricaras, and arrest the progress of Indian hostilities in that quarter, or at least to prevent its extension to the Pawnees (said to be nearly allied to the Ricaras) and other nations east and south thereof.

Two steam-boats are employed to transport the six companies of the 1st regiment from Baton Rouge to St. Louis; this will occasion an expense of about \$4,000. For the payment of this sum, and to meet the expenses of transportation, &c. of these companies from St. Louis, and the four companies of the 7th from Arkansaw to Council Bluffs. I have to request, that the Quartermaster General may be instructed to forward to the Assistant Quartermaster at St. Louis, the sum of \$12,000, which is deemed to be necessary to meet the expenses of transportation, &c. which will be incurred in the movements to Council Bluffs.

Very respectfully, I have the honor, &c. &c.

E. P. GAINES,
Major General by Brevet Commanding.

To Maj. Gen. BROWN.

Commanding U. S. Army, Washington City.

A true copy:

R. LOWNDS, *Aid-de-Camp.*

FORT ATKINSON,

July 7, 1823.

DEAR GENERAL: Before an opportunity offered to forward my letter of the 3d instant, and which I herewith enclose, an express arrived with a few lines to Major Foster, mentioning the loss of Lieut. Wickliff's boat and seven soldiers drowned. We have no particulars, except that most of the property was saved, and that the expedition was going on as usual, and expected to reach the *Grand Bend* against the 15th inst. At this post every thing goes on as well as could be expected.

Yours, &c.

BENJAMIN O'FALLON.

General ATKINSON, *Louisville, Kentucky.*

I certify the above to be a true copy,

R. LOWNDS, *Aid-de-camp.*

A. No. 2.

FORT ATKINSON,

July 3, 1823.

DEAR GENERAL: How painful it is for me to tell, and you to hear of the barbarity of the Indians! They continue to deceive and murder the most enterprizing of our people; and if we continue to forbear, if we do not discover a greater spirit of resentment, this river will be discoloured with our blood.

The defeat of General Ashley by the Aricaras, and departure of the troops to his relief had scarcely gone to you, when an express arrived announcing the defeat, by the Blackfoot Indians near the Yellow Stone River, of the Missouri Fur Company's Yellow Stone or Mountain Expedition, commanded by Messrs. Jones and Immel, both of whom, with five of their men, are among the slain. All their property, to the amount of \$15,000, fell into the hands of the enemy. To add to General Ashley's catalogue of misfortunes, the Blackfoot Indians have recently defeated a party of eleven and killed four of Major Henry's men, near his establishment at the mouth of the Yellow Stone. The express goes to state that many circumstances, of which I will be officially informed in a few days, have transpired to induce a belief that the British traders (Hudson Bay Company) are exciting the Indians against us, to either drive us from that quarter, or reap with Indians the fruits of our labor. I was in hopes that the British Indian Traders had some bounds to their rapacity. I was in hopes that during the late Indian War, in which they were so instrumental in the indiscriminate massacre of our people, that they were completely satisfied with our blood; but it appears not to have been the case—like the greedy wolf, not satisfied with the flesh, they quarrel over the bones. They ravage our fields, and are unwilling that we should glean them. Although barred by the treaty of Ghent from participating in our Indian trade, they presume, and are not satisfied to do so. But becoming alarmed at the individual enterprise of our people, they are exciting the Indians against them, They furnish them with the instruments of death, and a passport to our bosoms, Immel had great experience of the Indian character; but, poor fellow, with a British passport they at last deceived him, and he fell a victim to his own credulity, and his scalp, with those of his comrades, are now bleeding on their way to the British trading establishments. Another of General Ashley's wounded is dead, making fifteen men killed by the Aricaras, and eleven by the Blackfeet; in all, known to be killed by the Indians within the last two or three months, twenty-six effective men; and I estimate the amount of property lost in those conflicts at \$20,000, besides a number of horses, &c.

The Ottees, and Missouries, and ——— have been to see me, and as usual profess great friendship, &c.; but, with the rest of the neighbouring tribes, are anxiously looking and listening to know how we, the whites, are going to get out of this scrape. I am still much indisposed, and cannot enjoy health here.

Just as I am concluding this letter to you, I am interrupted by an express with a letter from Mr. Pilcher, in which he says, "I have but a moment to write. I met an express from the Mandans, giving me very unpleasant news. The flower of my business is gone, my mountaineers have been defeated, and the chiefs of the party both slain. I will write you more fully between this and the Sioux. The party was attacked by three or four hundred Blackfoot Indians, in a position on the Yellow Stone River, where nothing but defeat could be expected. Jones and Immel and five other men were killed. The former, it is said, fought most desperately. Jones killed two Indians, and as he was drawing his pistol to kill the third received two spears in his breast. Immel was in front; he killed one Indian, and was cut to pieces. I think we lose at least 15000 dollars."

The express left the military expedition on the first instant, when it was progressing rapidly.

I have the honor to be, &c. &c. &c.

B. O'FALLON,

United States' Agent, Indian Affairs.

Gen. ATKINSON.

A true copy,

R. LOWNDS, *Aid-de-Camp.*

B.—No. 1.

FORT ATKINSON,

July 8, 1823.

SIR: Since I wrote you at the end of the last month, I received a letter from Col. Leavenworth, dated on the 4th inst. two miles above Caball Bluffs, informing me that he had the misfortune to lose Lieut. Wickliff's boat, sergeant Stackpole, and six privates, drowned; he writes in haste, giving no particulars; but says that the principal part of the cargo was saved; that he was under way, and all well; he put that part of the cargo saved on board of the other boats and those of Mr. Pilcher.

I learnt from the two men who were the bearers of the Colonel's letter, that the boat broke into two across a snag, of course she must have sunk; the men were from Major Henry, and informed that Gen. Ashley was upon an Island, about one hundred miles below the Ricas Villages. I write hastily by the boat which leaves here this day, fearing an erroneous report should reach you.

WM. S. FOSTER,

Major U. S. Army.

General ATKINSON.

A true copy:

R. LOWNDS, *Aid-de-Camp.*

No. 2.

HEAD QUARTERS, WESTERN DEPARTMENT,

Louisville, Kentucky, July 26, 1823.

GENERAL: You will repair to the Missouri, and assume the command assigned you by my Department order of this date.

The immediate object of this command, is to support the detachment under Col. Leavenworth, and to give a timely check to the hostile spirit which has recently manifested itself among the Indians of the Upper Missouri, and, at the same time, to arrest or punish the Ricaras, and other warriors, by whom *thirty-three* of our citizens have been killed and wounded.

Six companies of the 1st infantry, under Col. Chambers, are this day instructed to join you at St. Louis, to act under your orders; to which will be added, should it be advisable, four companies of the 7th infantry. These will be directed to be held in readiness, subject to your orders, to join you at such time and place as you may find it necessary to direct.

Should the information, which may reach you at or beyond St. Louis, in your judgment suggest the propriety of your being supported by an additional force, you will, in this event, make application to the Governor of the State of Missouri, for a few companies, or, if necessary, a battalion of volunteer mounted riflemen. But it is not expected that this force will be required without satisfactory evidence should meet you, of some new act of hostility on the part of the Indians *below the Ricaras Villages*.

You will order, from St. Louis to Fort Atkinson, a supply of subsistence and ordnance stores, which, added to those now at that post, shall be sufficient for the regular troops destined for that post, during a period of nine months, from the 15th October next, at which time the first infantry should reach that post. And should it become necessary to obtain volunteers, you will, in that event, order up additional supplies, sufficient for such additional force during the time for which they may be employed—which should be for nine months, unless sooner discharged. And you will order the purchase of whatever subsistence may be necessary (to supply any deficiency that may be found in the Subsistence Department at St. Louis) to enable you to carry these measures into effect.

In the discharge of these duties, you will exercise a sound discretion, governing your movements and measures by the facts and circumstances that may be disclosed to you as you proceed, and by the instructions heretofore addressed to you, and in obedience to the “general regulations of the Army.”

You will keep me advised of your measures, and of the occurrences that you may deem interesting, connected with the command assigned you. With respect, &c. &c.

E. P. GAINES,

Major General by Brevet Commanding.

To Brig. Gen. H. ATKINSON,

United States' Army.

I certify the above to be a true copy:

R. LOWNDS, *Aid-de-Camp.*

—
No. 3.

HEAD QUARTERS, WESTERN DEPARTMENT,
Louisville, Ken. July 27, 1823.

SIR: Accompanying this, you will receive orders to repair with six companies of your regiment to St. Louis, on board the steam boats the *Favorite* and *Margaret*, to report to Gen. Atkinson.

The recent hostilities of the Ricaras, and other nations of Indians, up the Missouri, have rendered it necessary to assemble a force on that river, to support the sixth infantry; the disposable part of that regiment having marched a month since against the Ricaras.

Should the spirit of hostility, as there is reason to apprehend, extend itself to some of the neighboring tribes, the remaining part of your regiment will, in that case, after receiving recruits, for completing the regiment, be ordered to follow you. For the present, however, you will leave Lt. Col. Taylor in command, who will probably be joined by two companies of the fourth infantry.

General Atkinson will enclose to you the agreement made by him with the steam boats, for your transportation, to which you will require particular attention on the part of the commanders, as well as on the part of the troops.

I regret to find, that principal part of your subsistence has been hauled out to your summer cantonment. You will not, however, delay your movement so long, as to bring back any part of that supply, as most of it will be wanted out there; and as subsistence can be obtained on the lowest terms at St. Louis, it is not desirable that you should take the quantity mentioned in my order of yesterday's date. You need not take with you more than a supply for one month or six weeks.

Wishing health, &c.

I have the honor to be,

E. P. GAINES, *Maj. Gen. by brevet, Commanding.*

Col. CHAMBERS,

First U. S. Infantry.

I certify the above to be a true copy.

R. LOWNDS, *A. D. C.*

DEPARTMENT OF WAR,

August 14, 1823.

SIR: I have received your letter of the 28th ultimo, with the accompanying enclosures, and have submitted them to the President, who directs me to acquaint you, that he approves of the measures which you have adopted.

Although the command of Col. Leavenworth is small, yet, from his known courage and enterprise, I feel great confidence that his movement will be successful, and that the chastisement of the Ricaras will give peace and security to the frontier. Should such be the fact, you will halt the detachment you have ordered from the 1st and 7th regiments of infantry at Bellefontaine, until further orders. Should, however, the movement of Col. Leavenworth not be attended with the favorable result expected, or should the Indians continue to exhibit an hostile disposition, you will exercise a sound discretion, in pushing forward the necessary force to such points on the Missouri, as you may deem best calculated to maintain peace and to protect our citizens.

It is desirable that the disposable force of the army under your command only should be employed on this service. In the event of a failure of Col. Leavenworth's movement, you will add to the reinforcement already ordered to Gen. Atkinson's command, such other troops under your orders as you may judge requisite.

I am, &c.

J. C. CALHOUN.

Gen. E. P. GAINES, &c.
Louisville, Ken.

HEAD-QUARTERS, WESTERN DEPARTMENT,

Louisville, Ky. August 16, 1823.

SIR: I received not till last night the report of Col. Leavenworth, announcing his intention to visit the Ricaras Indians, dated the 18th June, 1823.

That report which accompanies this* contains no material fact differing from those transmitted by General Clark, Major Foster, and Major O'Fallon, referred to in my letter of the 28th of last month, except that the force intended to be taken by the Colonel is something less than that reported to have accompanied him.

He states that his party will be about 200 strong in rank and file—and he adds that, "if necessary it is expected that we can raise a considerable auxiliary force amongst the Sioux."

* Enclosed to the General in Chief.

As Colonel Leavenworth will probably report by express the result of his movement, I have reason to expect his report in the course of the next two weeks.

Very respectfully, I have the honor to be,

E. P. GAINES,
Major General by Brt. Comm'dg.

Hon. J. C. CALHOUN,
Secretary of War.

HEAD QUARTERS, WESTERN DEPARTMENT,

Near Louisville, Ky. August 30, 1823.

SIR: I received yesterday your letter of the 14th instant, by which I am gratified to learn that the measures adopted by me to strengthen the Missouri frontier, were approved by the President of the United States.

By letters just now received from Gen. Atkinson, with the enclosures to which he refers, from Col. Leavenworth and Mr. Pilcher, copies of which I enclose herewith, numbered 1, 2, and 3, it appears probable that the Mandan nation has determined to afford protection to the Ricaras. The distance between them is about 130 miles, the former occupying the country on the Missonri river, W. N. W. of the latter. It is moreover rumored that the Blackfoot Indians and the Sioux of the Missouri, will likewise unite with the Ricaras against us. Should these rumors prove to be well founded, even as to any two of those nations, another season, with all the disposable force of the army, will be required for their chastisement. Upon this subject, however, the next report from Col. Leavenworth will, I trust, afford satisfactory information. Until the receipt of that report no additional arrangements are deemed necessary for the supply of subsistence, or the concentration of force, beyond that which is now in motion.

The 4th infantry at Pensacola, with the four companies of the 1st now at Baton Rouge, is the only part of the troops in this Department that can safely be added to the force already ordered to march under Gen. Atkinson; for, such is the number and questionable character of the Sioux on the Mississippi, with some other Indians in that quarter, that not a company of the 5th infantry can properly be considered as disposable beyond the immediate vicinity of its position; and I am of opinion that the frontiers of Louisiana and Arkansas require a force at least equal to the six companies of the 7th infantry posted in that quarter. One of these companies, however,

might be sent to Baton Rouge, and the four companies of the 1st infantry now there detached up the Missouri, to join that part of the regiment heretofore ordered thither, and which is presumed to be now at St. Louis.

With great respect, I have, &c.

E. P. GAINES,
Major General by Brt. commanding.

Hon. J. C. CALHOUN,
Secretary of War.

No. 1.

HEAD QUARTERS, RIGHT WING, WESTERN DEPARTMENT,

St. Louis, August 19th, 1823.

SIR: I have the honor to enclose, herewith, the copy of a letter from Colonel Leavenworth to Major O'Fallon, and the copy of a letter from Mr. Pilcher, acting partner of the Missouri Fur Company, to the same gentleman, containing extracts of letters from Messrs. Keemle and Gordon, traders attached to that firm. These letters give the latest information from the expedition under Colonel Leavenworth, and the most direct, of the attack of the Blackfoot Indians upon Im-mel and Jones.

Notwithstanding the opinion of Mr. Pilcher, as well as most persons here, that the Aricara Indians will await in their village the arrival of the troops under Colonel Leavenworth, and there give battle, I cannot bring myself to believe so. They, very early after their attack on General Ashley's party, made arrangements with the Mandan Indians to take refuge with them. This step shows, certainly, a determination on their part to flee before any formidable white force; and I, therefore, conclude it will require at least another season to chastise them effectually.

Under the most favorable aspect of affairs on the Upper Missouri, I am of opinion it will require an effective disposable force of some six or seven hundred regular troops to operate decisively in that quarter, and to preserve tranquillity in future. The whole of the first regiment, added to the sixth, and both being filled to the establishment, will, I presume, be ample for the object. With these corps, after leaving four companies of the sixth at Council Bluffs, sixteen companies may move up the Missouri, and effect any practicable object; establish the first regiment at the Yellow Stone or Mandan, and let the six companies of the sixth regiment fall back to its present position.

Every year afterwards, several companies of the sixth might ascend the river, and, in conjunction with the first regiment, explore all the upper country intersected by streams navigable for keel boats, and, consequently, hold intercourse with all the upper Indians.

There is no indication of a disposition on the part of any of the tribes that have intercourse with the post at Council Bluffs, of hostility. It is said, however, that part of the band of Scione Sioux, (the tribes next to the Aracaras,) show some inclination to join their hostile neighbours; if so, this spirit of disaffection may extend to more, or all the Sioux.

I have advised Colonel Snelling to have a watchful eye towards the Sioux of the St. Peter's, for the reasons above stated.

I sent, by express, a few days since, an order to the commandant at Council Bluff, to advise me, by express, of the result of the enter-prise under Colonel Leavenworth, as soon as it was known. I look for some such information in two weeks more.

As it is highly important that the detachment of the first regiment should carry up transport boats sufficient for its own operations, I shall send it in that way, should not circumstances above render a prompt movement by land necessary.

I will keep you advised of every circumstance worthy of note as they come to my knowledge.

With great respect, &c.

H. ATKINSON,

B. G. S. A.

P. S. I have had the honor to receive your letter of the 8th inst.

Major General GAINES,

Com'g. West. Depart. Louisville, Ky.

I certify the above to be a true copy.

R. LOWNDS, *Aid de Camp.*

No. 2.

FORT RECOVERY,

July 21st, 1823.

DEAR MAJOR: Your favor of the 10th inst. I have this minute received, and, I assure you, with great pleasure. I was, also, highly gratified that Majors Woolley and Ketchum came on to join us.

Mr. Pilcher I have requested to write you fully as to Indian affairs, and he is so much better informed than myself, that I shall leave that subject principally to him. He is, I find, very efficient, and has con-ducted greatly to my satisfaction.

These Yanctons appear to be zealously determined to co-operate with us, but I have some doubts as to the continuance of their ardor. We have been obliged to make a halt here of three days to wait for Mr. Pilcher, and to repair damages sustained from wind and water. After so many disasters, I am happy to inform you that we are yet efficient, perhaps as much so as when we set out. Our powder was *miraculously* preserved; several casks which were under water all night were entirely uninjured. I have borrowed ten rifles of Mr. Pilcher, and can have twenty-three more of General Ashley, but eight only are necessary to complete. Powder and lead I can obtain in ample quantities. If the Aracaras and Mandans unite, I shall proceed to the Mandans; and if they keep the Aracaras in their village, shall attack them. We shall do our best to obtain a victory. The honor of the American arms must be supported at all events. But I can plainly perceive that our force is not sufficient to inspire that degree of awe and respect amongst the Indians which I would wish. We make but a small show on a large prairie by the side of four or five hundred mounted Indians. If we can obtain a fair fight, our superiority will probably be more apparent.

As I have to write on the ground in a heavy wind, I fear you will not be able to read my letter. You will, however, have the goodness to excuse inaccuracies, and my want of time and means to send you a fair copy.

H. LEAVENWORTH,
Colonel U. S. A.

Major O'FALLON, &c.

I certify the above to be a true copy.

R. LOWNDS, *A. D. C.*

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No. 3.

FORT RECOVERY,
Upper Missouri, 23d July, 1823.

DEAR SIR : From the following extract of a letter from Mr. William Gordon, a young gentleman in the service of the Missouri Fur Company, and attached to our Mountaineers, you will see that they have been defeated, and the chiefs of the expedition, Mr. Immel and Mr. Jones, have both been slain. The extracts from Mr. Keemle's letters will show the disposition and feelings of the Mandans and Grosventres, produced by the late success of the Ricaras against General Ashley; and the whole will, I hope, tend to shew the importance of Colonel Leavenworth's expedition against the Ricaras. If protection to the commerce of the Missouri be the object of our go-

vernment, this would seem to be the accepted time; a decisive blow is indispensable for the safety of every white man on the river above the Council Bluffs, and even to the troops stationed at that post. But I need not dwell upon this subject: you know too well the importance of the movement.

The following is an extract from Mr. Gordon's letter, dated

FORT VANDERBURGH,
Mandan and Grosventre's Villages, June 15, 1823.

DEAR SIR: It becomes my unpleasant duty to inform you of the defeat of our party by the Black Foot Indians, and of the dire consequences of the same. After penetrating to the Three Forks of the Missouri, early in the Spring, although we found that country almost entirely trapt out by the Indians, we had succeeded, by the greatest perseverance, in taking about —— packs of beaver. On the 16th of May, having reached the Upper Three Forks of R. Jefferson's river, and finding no beaver in that quarter, we commenced a retrograde march for the Yellow Stone. On the second day we fell in with a party of 38 Black Foot Indians. They came up boldly, and smoked, and remained with us during that night, making every profession of friendship; and, in the morning, after making them presents of such articles as we could spare, they parted with us apparently well satisfied, having first invited us to come and establish at the mouth of the Maria River, as they said they had been informed was our intention. They were in possession of every information in regard to the two boats being at the mouth of the Yellow Stone, and of their determination to ascend the Missouri to the Falls. This information must have been derived from the British traders, who have most probably instigated them to commit this outrage, and by them, no doubt, from some faithful correspondent at St. Louis. We did not suffer ourselves, however, to be lulled into false ideas of security by their friendly professions, but commenced a direct and precipitate retreat from the country, keeping out a strict regard [guard] every night, and using every possible vigilance at all times. This party of 38 had returned to their village, which was very close, and recruited to the number of between 3 and 400 men. These had intercepted us on the Yellow Stone, where they arrived two days before us. They lay in ambush for us on the side of a steep hill, the base of which was washed by the river, along which we had to pursue the intricate windings of a buffaloe trace, among rocks, trees, &c. by means of which they had secreted themselves. At this place the men were, of course, much scattered for a considerable distance, as two horses could not pass abreast. At this unfortunate moment, and under circumstances so disadvantageous, they rushed upon us with the whole force, pouring down from every quarter. Messrs. Immel and Jones both fell early in the engagement. A conflict, thus unequal, could not be long maintained. The result was the loss of five other

men killed, four wounded, the entire loss of all our horses and equipage, traps, beaver, and every thing. The balance of the party succeeded in escaping, by making a raft, and crossing the Yellow Stone. This took place on the 31st of May, just below the Mountains, on the Yellow Stone. Not knowing to what extent the loss of the horses, traps, &c. might effect [affect] any future plan of operations I came with all possible expedition to this place, to acquaint you with the circumstance. I left Mr. Keemle and the party near the mouth of Pryor's Fork, making skin canoes to bring down the Fall's hunt, amounting to about —. Four of Mr. Henry's men have also been killed near the Falls. It appears, from information derived from the Black Feet themselves, that the British have two trading houses in their country on the American territory; and, from some Snake Indians, we learned that they have several on the South Fork of the Columbia. Something decisive should be done.

Believe me to be,

Your sincere friend,

WILLIAM GORDON.

From the foregoing letter, you will perceive, that the commerce of the Missouri, under existing circumstances, however valuable, is truly precarious. This, our second adventure to the mountains, had surpassed my most sanguine expectations; success had been complete, and my views fulfilled in every respect. Mr. Immel and Mr. Jones had conducted those expeditions with the greatest skill and ability, and proved themselves worthy of my confidence. The loss of property is severely felt, yet it is little, compared to the loss of those valuable men to whom I stand indebted for the accomplishment of my views. In consequence of their late departure, last summer, from the Council Bluffs, it became necessary for them to confine their operations last fall to the Yellow Stone and its tributary waters, and winter at the mouth of the Big Horn. The party originally consisted of forty-three persons, including themselves and Messrs. Gordon and Keemle, two young gentlemen attached to the expedition, and to whom I am much indebted for their activity in bringing off the remainder of the party, and securing the property of the expedition, which had been left on the Yellow Stone at the time the expedition moved to the Three Forks early in the spring. The party had been reduced to thirty, including all; a part of the men having deserted from their wintering post at the Big Horn. With these, they penetrated the country as mentioned in Mr. Gordon's letter. I am happy to say their defeat is not to be attributed to negligence, mistaken confidence of their own ability, or the good will of the Indians. Three hours more would have taken them to the Crow nation, where they would have been perfectly secure; this tribe being at war with the Blackfeet, and much attached to the whites. But the Blackfeet had marked their route; they knew their country and advantages of the position selected by them for the attack: there they intercepted them, and awaited their arrival. Nothing but defeat could be expected under such circumstances, and it is wonderful how any should escape from such an overwhelming

force, when attacked in such an unfavorable position. Many circumstances justify the opinions expressed in Mr. Gordon's letter, which I will hereafter relate; time will not allow me to do so at present.

Mr. Keemle arrived at the Mandans in a short time after Mr. Gordon left him on the Yellow Stone, and, in a letter to me, under date of the 10th of the present month, which met me at this place, he expresses himself as follows: "Permit me, sir, here to remark, that the present affair with the Ricaras, is the subject of daily conversation with the Grosventres and Mandans; and I am of opinion, from many remarks made by the principal men of both nations, that much of the future welfare and interest of the persons engaged in the business of the Missouri, depends much upon the course of conduct pursued towards that band of savage villains." In another letter from him, of the 11th instant, conveyed by the same hand, he gives me the following information: "A council was held by the Mandans on the 10th instant, in which they have determined to send for the Ricaras to enter their village, in order to protect them, as they say, from the whites. A singular [similar] proposition was made to the Grosventres by the former nation, but they shut their ears against it." The Aricaras opened a fire on the men who came express with these letters, and continued it until they had got beyond their reach, though they did not succeed in hurting either of them. From these circumstances, you may suppose that the future conduct and disposition of all those upper tribes, even the Sioux, depend much on the steps taken in relation to the Aricaras. There are many opinions respecting the course the Aricaras will take. My own impressions are, that they will not abandon their villages, but will await the arrival of the expedition, and give us battle. Many things induce a belief that they will not attempt to go to the Mandans for protection. About twelve days will decide it. The expedition left this place early this morning.

The foregoing circumstances, together with many other causes, will induce me to change the destination of our mountain men this fall. If time would justify the attempt, I would endeavor to push the expedition across the mountains to some of the southern branches of the Columbia, but the season is too far advanced.

I am, dear sir, &c.

JOSHUA PILCHER,
A. P. Missouri Fur Company.

Major B. O'FALLON,
U. S. Agent for Indian Affairs.

HEAD QUARTERS, WESTERN DEPARTMENT,*Near Louisville, Ky. Sept. 8th, 1823.*

SIR: The last mail from St. Louis arrived, without bringing the looked-for report of Colonel Leavenworth, or any information whatever from the Missouri frontier.

Respectfully, I have the honor to be,

E. P. GAINES,
Maj. Gen. by Brevet, Commanding.

Hon. JOHN C. CALHOUN,
Secretary of War.

HEAD QUARTERS, WESTERN DEPARTMENT,*near Louisville, Ky. September 13th, 1823.*

SIR: A letter from General Atkinson, dated at St. Louis, the 5th instant, a copy of which I enclose herewith, reports the arrival at that place, of the six companies of the 1st infantry, ordered up the Missouri.

From Colonel Leavenworth, I have received nothing since the date of his letter referred to in mine of the 30th ultimo.

I have the honor to be, &c.

E. P. GAINES,
Major General by Brevet.

Hon. JOHN C. CALHOUN,
Secretary of War.

HEAD QUARTERS, RIGHT WING, WEST. DEPARTMENT,*St. Louis, 5th September, 1823.*

SIR: I have the honor to inform you, that two companies of the 1st Regiment, under Major Whartonby, arrived at this place from Baton Rouge, on Friday evening last, and that four companies came up on Tuesday, under Colonel Chambers.

The whole are now encamped a short distance above the city, where they will remain for three days more, when they will take up their movement for Council Bluffs.

I have not heard of Colonel Leavenworth, since I addressed you on the 19th ultimo, enclosing copies of letters from him, and from Mr. Pilcher to Major O'Fallon; I calculate, however, on hearing, in less than a week, the result of his enterprize against the Ricaras

Indians, which will determine me with regard to pushing Colonel Chambers' detachment through by land. In the mean time, I have prepared transport boats, and shall send off the detachment, with their provisions and stores, by water, as I shall have it in my power to detach at any time, a command from the boats, to be pushed on by land, should circumstances above render it necessary. I have adopted this mode, because, if the troops transport their own supplies, it will save the United States some \$6,000, and the fact of their setting out by water will retard their arrival at the Bluffs but a little, should the state of affairs in the upper country make it necessary that they should ultimately go by land, as all they progress by water will so much shorten the distance.

The detachment, as you will see by the enclosed report, is weaker than you anticipated; forty-five are reported sick, but none are seriously indisposed, except the Adjutant; all the men will be able to move with the detachment.

Every thing justifies a belief, that Colonel Chambers' movement will be as prompt and successful as you anticipated. Late advices from the Upper Mississippi represent every thing to be tranquil in that quarter; some letters and returns from thence, addressed to me, are sent to you, under cover, by Lieutenant Russell, who will deliver this communication.

I will avail myself of every opportunity to keep you advised of every circumstance of interest within my command.

With very great respect, &c.

H. ATKINSON,

Brig. Gen. U. S. Army.

Major General E. P. GAINES, &c.

HEAD QUARTERS, WESTERN DEPARTMENT,

Louisville, Ken. July 12, 1823.

SIR : I have this moment received, from Governor Clark, a letter, of which the enclosed is a copy.

I have but little doubt of the force which Col. Leavenworth has taken with him for the purpose of chastising the Ricaras for the outrage committed on Gen. Ashley's party, will be ample for the object.

Two hundred and twenty soldiers, eighty men of the traders, with thirty men under Gen. Ashley, and perhaps two to three thousand Sioux Indians, is sufficient to destroy any Indian force that the upper tribes can bring against them.

Until the result of the expedition under Col. Leavenworth is known, it is unnecessary to give any orders touching the matter; par-

ticularly as the contest will be long over before reinforcements could reach the scene of action. Besides, the garrisons on the Upper Mississippi are too weak at present to draw detachments from them, only in cases of great necessity, and the detachment of recruits under Capt. Fowle will reach the Bluffs in August.

Should Col. Leavenworth fail, measures shall be promptly taken to meet occurrences.

In the mean time, I shall be glad to receive from you such instructions touching the matter, as may be deemed advisable.

With great respect, Sir,

I have the honor to be

Your most obedient servant,

H. ATKINSON, Br. Gen. U. S. A.

Commanding Western Depart.

Maj. Gen. BROWN,

Commanding in Chief,

Washington City.

A true copy.

CHS. J. NOURSE, Adj. Gen. Acting.

ST. LOUIS, July 4, 1823.

DEAR GENERAL: I have merely time to say to you, that I have received this day a letter from Maj. O'Fallon, stating, that General Ashley was attacked by the Ricaras, on the morning of the 2d of June, (after a friendly intercourse of two days) and defeated, with the loss of fourteen men killed and nine wounded. The General retreated down about twenty-five or thirty miles, and remained with thirty men in one boat; sent his other boat, and the disaffected and wounded, to Fort Atkinson, with a statement of his situation, to Col. Leavenworth and Maj. O'Fallon. On the 22d, Col. Leavenworth set out up to the Aricaras, with two hundred and twenty regular troops, and about eighty men of the companies, to be joined by a large party of Sioux. The Colonel has taken with him cannon, as the Aricaras are strongly fortified. I have but little doubt of the success of our troops, if the Indians remain in their towns to fight; which is very doubtful, if they discover the strength of the force.

WM. CLARK.

Gen. H. ATKINSON.

A true copy.

CHS. J. NOURSE, Adj. Gen. Acting.

HEAD QUARTERS, WESTERN DEPARTMENT,

Louisville, Ken. July 15th, 1823.

SIR: Since addressing you yesterday, on the subject of Governor Clark's letter relative to the attack of the Ricara Indians on Gen. Ashley's party, I have, on reflection, ordered Capt. Fowle to march across the country to Council Bluffs, with a hundred men of the detachment of recruits of the 6th regiment. I think the state of affairs on the upper Missouri calls for the measure—not that I think there is much to be apprehended as to the failure of Col. Leavenworth in the object of his march, or of hostile movements on the part of other tribes—yet, an early addition of an hundred men to the remaining garrison at Council Bluffs will give complete security to the post, and the promptness with which they will be marched across the country will impress the Indians in that quarter with a just idea of our capacity to chastise every outrage they may commit.

I have directed that the detachment be provided with pack-horse transportation, as that mode will greatly facilitate their movement, and be much less expensive than employing wagons. The horses may be purchased for 30 to 50 dollars each, and performing the trip be on hand as public property.

Enclosed is a copy of my order to Capt. Fowle, which will give you a full knowledge of the measures I have taken. The order will reach Capt. Fowle in five or six days.

It was sent by an officer of the 5th regiment, who went in a steam-boat that sailed to-day for St. Louis, at about which time the detachment will also reach there.

I shall pay due attention to every thing relating to affairs on the Missouri, and take prompt steps to meet exigencies. For the present, I deem it unnecessary to do more than I have ordered.

With great respect, Sir, I have the honor to be,
Your most obedient servant,

H. ATKINSON,
Brig. Gen. U. S. Army, com. W. Department.

Maj. Gen. BROWN,
Commander in Chief, Washington City.

A true copy.

CHARLES J. NOURSE, *Adjutant General, Acting.*

HEAD QUARTERS, WESTERN DEPARTMENT,

Louisville, July 18th, 1823.

SIR: In consequence of Col. Leavenworth having moved, with the principal part of the 6th regiment, against the Ricara Indians,

who have lately committed an outrage on Gen. Ashley's party, it is very important that you should reach Council Bluffs with the detachment of recruits of the 6th regiment, under your command, as early as possible.

As the voyage by water to your point of destination is tedious, and will necessarily protract your arrival, you will march from St. Louis by the way of Clay Courthouse, and thence along Ray's trace, with one hundred picked men of the detachment for Council Bluffs. The residue of the detachment you will leave under an officer or two, to ascend the Missouri, with one or two of the transport boats and the whole baggage of the detachment.

Capt. Brandt, Assistant Quartermaster General at St. Louis, is ordered to furnish the necessary transportation for your march, which should be as limited as possible; as pack-horse transportation will both facilitate your movement and curtail expenses, you will adopt that mode—18 or 20 horses, I presume, will be ample, as you will find at the Bluffs all necessary supplies, and you will want to take little else with you from the upper settlements than some 8 or 10 days provisions.

Lieut. Brown, Assistant Commissary, is instructed to furnish provisions for the land detachment, both at St. Louis and at the upper settlements.

Depending on your promptness and energy for the execution of the objects above stated,

I am, &c. &c. &c.

H. ATKINSON,
Brig. Gen. U. S. Army com. W. Department.

Capt. FOWLE,
5th Reg't Infantry, Missouri.

A true copy.

CHARLES J. NOURSE,
Adjutant General, Acting.

HEAD QUARTERS, WESTERN DEPARTMENT,
Louisville, Kentucky, Aug. 16th, 1823.

GENERAL: I received last night the report of Col. Leavenworth, announcing his intention to visit the Ricaras Indians, dated June 18th, 1823.

This report, which I enclose herewith, contains no material fact differing from those transmitted by General Clark, Major Foster, and Major O'Fallon, referred to in my letter to you of the 26th of

last month, excepting only that the force intended to be sent by the Colonel, is something less than that reported to have accompanied him. He states that his party will be about 200 strong in rank and file, and adds "if necessary, it is expected that we can raise a considerable force among the Sioux."

As Col. Leavenworth will probably report by express the result of his movement, I have reason to expect it in the course of the next two weeks.

Very respectfully,

I have the honor to be,

E. P. GAINES,

Major General by Brevet, Com'ing.

Maj. Gen. JACOB BROWN,
General in Chief.

A true Copy:

CH. J. NOURSE, *Adj. Gen. Acting*

FORT ATKINSON, 18th June, 1823.

DEAR SIR: I have just received a letter from General Ashley, giving information of an attack upon his party by the Auricara Indians, by which it appears that not only the survivors of his party, but many other American citizens are in the most imminent danger. A copy of the General's letter I herewith enclose, and, also, a copy of an order which I have issued on the subject. I can only add, that we shall leave here for our destination as soon as possible, which I hope will be to-morrow or next day. We shall take two six pounders and small swivels, and, perhaps, a howitzer. My party will be about 200 strong in rank and file. If necessary, it is expected that we can raise a considerable auxiliary force amongst the Sioux. We shall do all we can to support the honor of your regiment, and hope, with the blessings of Heaven, to meet the approbation of our superiors and of our country. We go to secure the lives and property of our citizens, and to chastise and correct those who have committed outrages upon them. It will be our endeavor to do this as peaceably as the nature of the circumstances which may occur will admit.

I have the honor to be, with perfect respect,

Your obedient servant,

H. LEAVENWORTH, *6th Reg.*

Brig. Gen. H. ATKINSON,
Com'ing West'n Dept. Louisville, Ky.

A true Copy:

CH. J. NOURSE, *Adj. Gen. Acting.*

ON BOARD THE KEEL BOAT YELLOW STONE,
25 miles below the Aricara Towns, 4th June, 1823.

DEAR SIR : On the morning of the 2d inst. I was attacked by the Aricara Indians, which terminated with great loss on my part. On my arrival there, the 30th of May, I was met very friendly by some of the chiefs, who expressed a great wish that I would stop and trade with them. Wishing to purchase horses to take a party of men to the Yellow Stone river, I agreed to comply with their request, and proposed that the chiefs of the two towns would meet me that afternoon, on the sand beach, when the price of horses should be agreed upon. After a long consultation among themselves, they made their appearance at the place proposed. I made them a small present, and proposed to purchase 40 or 50 horses. They appeared much pleased, and expressed much regret that a difference had taken place between some of their nation and the Americans, alluding to the fray which recently took place with a party of their men and some of the Missouri Fur Company, which terminated in the loss of two of the Aricas, one of whom was the son of the principal chief of one of the two towns. They, however, said, that all the angry feelings occasioned by that affray had vanished, and that they considered the Americans as friends, and would treat them as such; that the number of horses I wanted would be furnished me for the price offered.

The next morning we commenced trading, which continued until the evening of the 1st inst., when preparations were made for my departure early the next morning. My party consisted of ninety men, forty of whom were selected to take charge of the horses, and cross the country, by land, to the Yellow Stone. They were encamped on the bank, within forty yards of the boats.

About half past 3 o'clock in the morning, I was informed that one of my men had been killed, and, in all probability, the boat would be immediately attacked. The men were all under arms, and so continued until sunrise, when the Indians commenced a heavy and well directed fire, from a line extending along the picketing of their towns, and some broken ground adjoining, about 600 yards in length. Their shot were principally directed at the men on the beach, who were making use of the horses as a breast-work. We returned the fire; but, from the advantageous situation of the Indians, done but little execution. Finding their fire very destructive, I ordered the steersmen to weigh their anchors, and lay to shore for the purpose of embarking the men; but, notwithstanding I used every measure in my power to have the order executed, I could not effect it. Two skiffs, which would carry 30 men, were taken ashore; but, in consequence of a predetermination, on the part of the men on board, not to give way to the Indians as long as they could possibly do otherwise, they (with the exception of seven or eight) would not make use of the skiffs when they had an opportunity of doing so. In about fifteen minutes from the time the firing commenced, the surviving part

of the men were embarked; nearly all the horses killed or wounded; one of the anchors had been weighed, the cable of the other cut, and the boats dropping down the stream.

The boatmen, with but few exceptions, were so panic struck, that it was impossible to get them to expose themselves to the least danger, indeed, for some time, to move from their seats. I ordered the boat landed at the first timber, for the purpose of putting the men and boats in a better situation to pass the villages in safety. When my intentions were made known, to my surprise and mortification, I was told by the men (with but few exceptions that, under no circumstances, would they make a second attempt to pass, without a large reinforcement. Finding that no arguments that I could use would cause them to change their resolution, I commenced making arrangements for the security of my property. The men proposed, that, if I would descend the river to this place, fortify the boats, or make any other defence for their security, that they would remain with me until I could receive aid from Major Henry, or from some other quarter. I was compelled to agree to the proposition. On my arrival, I found them as much determined to go lower. A resolution had been formed by the most of them to desert. I called for volunteers, to remain with me under any circumstances, until I should receive the expected aid. Thirty only volunteered; among them were but few boatmen; consequently, I am compelled to send one boat back. After taking a part of her cargo on board of this boat, the balance will be stored at the first fort below.

My loss in killed and wounded is as follows:

KILLED.	WOUNDED.
Jno. Matthews	Reece Gibson, (since dead.)
Jno. Collins	Joseph Monse
Aaron Steevens, { killed at night in the fort.	John Lawson Abraham Ricketts
James McDaniel	Robert Tucker
Westley Piper	Joseph Thompson
George Flage	Jacob Miller
Benj'n F. Sweed	Daniel McClain
James Penn, jr.	Hugh Glass
Jno. Miller	August Dufier
John S. Gardner	Willis, (black man.)
Ellis Ogle	
David Howard.	

I do not conceive but two of the wounded in danger. How many of the Indians were killed, I am at a loss to say; I think not more than seven or eight; four or five were seen to fall on the beach. I thought proper to communicate this affair as early as an opportunity offered, believing that you would feel disposed to make those people account to government for the outrage committed. Should that be the case, and a force sent for that purpose in a short time, you will oblige me much if you will send me an express, at my own expense, if one can

be procured, that I may meet and co-operate with you. From the situation of the Indian towns, it will be difficult for a small force to oust them without a six pounder. The towns are newly picketed in, with timber from six to eight inches thick, twelve to fifteen feet high, dirt in the inside thrown up about eighteen inches. They front the river, and, immediately in front of them, is a large sand-bar, forming nearly two-thirds of a circle, at the head of which (where the river is very narrow) they have a breast-work, made of dry wood. The ground on the opposite side of the river is high and commanding. They have about six hundred warriors, I suppose, three-fourths of them armed with London fuzils, others with bows and arrows, war axes, &c. &c.

I expect to hear from Major Henry (to whom I sent an express) in twelve or fifteen days. During that time, I shall remain between this place and the Aricara towns, not remaining any length of time in one place, as my force is small, not more than twenty-three effective.

Your friend and obedient servant,

W. H. ASHLEY.

On board the boat that descends are five wounded men. Any assistance that you can afford them, I will feel under obligations to you for.

A true copy :

H. LEAVENWORTH,
Colonel Commanding 6th regiment.

Directed to Major B. O'Fallon, Indian Agent, or to the commanding officer at Fort Atkinson.

A true copy :

CHS. J. NOURSE,
Adjutant General, Acting.

HEAD QUARTERS, 6TH INFANTRY,

Fort Atkinson, 18th June, 1823.

ORDERS.

The Colonel commanding has to announce to his command, that the Aricara Indians have attacked a party of Americans, under the command of Gen. Wm. H. Ashley, Lt. Governor of the state of Missouri, who had a regular licence from the Government of the United States, agreeably to the laws of Congress for regulating trade and intercourse with the Indians. Fourteen of Gen. Ashley's party have been killed, and nine wounded. The lives of more than one hundred American citizens, now in the Indian country, are in the most imminent danger. Gen. Ashley, and about thirty men of his party, still bravely remain in the face of their savage enemy, and the General asks for assistance. The Colonel commanding deems it his duty to

afford assistance to the survivors, and to chastise those Indians for the outrage which they have committed. And on this subject, there is the most perfect coincidence of opinion between the Colonel commanding and Maj. Benjamin O'Fallon, the United States' Agent for Indian affairs on the Missouri. The Colonel commanding is sure of the zealous co-operation and efficient support of Maj. O'Fallon, and the officers generally of the regiment which he has the honor to command.

Companies A, B, D, E, F, and G, will be prepared, as soon as possible, to march at a moment's warning. After the departure of the Colonel commanding, the command of the residue of the regiment of the post, will devolve upon Major Foster. It is hoped and expected, that the most zealous exertions will be made by every individual of the regiment, left here, to save the crops, and preserve the public property. In Major Foster's zeal and efficiency, and those generally who will remain, the Colonel commanding has the fullest confidence. He is aware, that their duties will be arduous, perhaps more so than those who will ascend the river. If any glory should be acquired, the regiment generally will share it; if those who ascend the river are unfortunate, they must bear it alone.

The acting post Quartermaster will immediately engage the keel boat called the Yellow Stone Packet, and her crew, and as many of the efficient men with her as practicable. In case he succeeds in engaging the boat, her cargo will be immediately stored. One of the public boats will be selected and immediately put in good order to ascend the river. A future order will be given on the subject of ammunition and subsistence.

H. LEAVENWORTH,
Colonel Commanding.

A true copy.

Chas. J. Nourse, *Adj. Gen. Acting.*

HEAD QUARTERS, WESTERN DEPARTMENT,
Near Louisville, Ken. Aug. 24, 1823.

GENERAL: I have the pleasure to transmit, herewith, a copy of a letter from General Atkinson, with an extract from Gen. Ashley, affording more satisfactory information as to the probable strength of the auxiliary force expected to join Col. Leavenworth, and of the prospects of success against the Ricaras, than I have heretofore had it in my power to obtain.

Judging from my recollections of the reported distances of the several places mentioned by General Ashley, I infer, that, at the date of his letter, (19th July, 1823,) the force under Colonel Leavenworth was then within two hundred miles of the Ricaras. Allowing him, therefore, twelve days for the accomplishment of his movement, there is

reason to believe, that he must have given them a trial of his strength about the first of the present month. Should his white and red auxiliaries have proven to be firm and faithful, there is much reason to hope for the most favorable result.

With great respect,

I have the honor to be, &c.

E. P. GAINES, *Maj. Gen. by brevet.*
Commanding.

*Maj. Gen. JACOB BROWN,
General in Chief, Washington City.*

A true copy.

CH. J. NOURSE, Adj. Gen. Acting.

HEAD QUARTERS, RIGHT WING, WESTERN DEPARTMENT,

St. Louis, August 15, 1823.

SIR: I have received some unofficial information from the expedition under Colonel Leavenworth, as late as the 19th ultimo, by a letter addressed to Colonel O'Fallon from General Ashley, an extract of which is enclosed herewith.

A Mr. Smith, who came down with the proceeds of the trappers and hunters of General Ashley, from the mouth of the Yellow Stone, gives, also, some verbal news, to the following effect, viz: He left the Yellow Stone with Mr. Henry, with all the party under him, except twenty men left in the fort at the mouth of the Yellow Stone—proceeded to join General Ashley at the mouth of the Shyau river. On passing the Ricara village, the Ricaras came down on the beach, and invited them, in a friendly manner, by signs with buffalo robes, to land. Major Henry, knowing the deception they were attempting to practice upon him, for the purpose of getting him into their power, proceeded down the river without holding any intercourse with them.

Mr. Smith informs me that Colonel Leavenworth was progressing on very well, and expected to accomplish the object of his movement. I, however, think the Ricaras will, on hearing of his approach, move off to the Mandans, or some distant point. I have no idea they will remain in their villages for the purpose of defending themselves there; consequently, it will require another season to bring those Indians to a proper account for their transgressions.

I shall be prepared to push the first regiment on, upon its arrival here.

I have, &c.

H. ATKINSON,

Brigadier General United States' Army.

Maj. Gen. GAINES, &c.

A true copy.

CHARLES J. NOURSE, Adjt. Genl. Act.

Extract of a letter from General Ashley to Colonel O'Fallon, dated at Fort Brassaux, July 19, 1823.

"I remained at, and in the neighborhood of, the mouth of the Shyanne river, until Major Henry joined me. We then concluded that, should troops be sent up the river this year to fight the Ricaras, that they would not ascend until fall, when it would be too late to do any thing in our business this year. Accordingly, we concluded to drop down to the mouth of the Teton river, and, if possible, purchase as many horses as would enable us to fit out the party intended to be sent to the Columbia. Understanding that the Sioux Indians were in the neighborhood, I came here a few days since to get horses from them. To my great satisfaction, on my arrival, I was informed of the approach of Colonel Leavenworth with two hundred men. He will pass this place to-day with his command. I leave here this evening for my camp, which is about one hundred and twenty miles above, and will have things ready to join him with eighty men, by the time he reaches that point. Some of the gentlemen of the Missouri Fur Company have joined him with forty men; from four to five hundred Sioux Indians are encamped about twenty miles above this, waiting the Colonel's arrival, and intend co-operating with him. Our whole force will be about eight hundred men, which will be sufficient to destroy the greater part of the Ricaras, in a very short time after reaching their towns, should they not escape before that time. It is said that they have proposed to the Mandans to permit them to move up and live with them, which it is supposed the Mandans will consent to, but, if so, very contrary to the wishes of the Grosventres.

W. H. ASHLEY."

A true copy.

CHARLES J. NOURSE,
Adjutant General, Acting.

HEAD QUARTERS, WESTERN DEPARTMENT,

near Louisville, Ky. September 1st, 1823.

SIR: Accompanying this you will receive, for the information of the General in Chief, the copy of a letter from Col. Leavenworth to Major O'Fallon, dated at Fort Recovery, 21st of July, 1823.

The letter referred to by Col. Leavenworth; from Mr. Pitcher, was transmitted to the Department of War by the last mail. It contains a detailed account of the attack, by the Black-foot Indians, on the trading and hunting parties under Messrs. Inman and Jones; and a report that the Mandans had invited the Ricaras to their nation, 130 miles above the Ricaras, and had promised to protect

them against us. Col. Leavenworth's position at the date of his letter is not described in any paper in my possession; but I judge it to be within 150 miles of the Ricaras. I am persuaded, therefore, that his report of the result of his movements may reach this place by the latter end of next week, as arrangements are made to convey it from Fort Atkinson by express. Until the receipt of that report, no other measures than those which I have heretofore adopted and reported, are deemed necessary for the concentration of supplies, or of force beyond that which is already in motion.

Should Col. Leavenworth fail to restore peace with the Ricaras; or should he meet with any serious check from the Ricaras or their allies, the detachment of the 1st and 7th infantry, under Gen. Atkinson, will immediately be pushed up the Missouri as far as the season will permit and the service may require, and may ultimately return to and winter at Council Bluffs. And as he will stand in need of several boats to aid him in his operations against the Indians, he will obtain a supply at St. Louis, and go from thence by water with the whole or principal part of his force, taking with him, and affording protection to, the subsistence and other supplies necessary for his command.

Should the Black-foot Indians, with the Mandans and the Sioux of the Missouri, or either of the two last mentioned nations, unite with the Ricaras, as it is rumoured they will, I shall in this case order the 4th infantry from Pensacola, and the four companies of the 1st infantry near Baton Rouge (after posting a company of the 7th from cantonment Jesup at Baton Rouge) in October, or early in November next, in order to enable them to put themselves in temporary huts at Fort Osage for the winter, or, if necessary, to profit by the ice and snow of February and March, to proceed in sleighs to the Bluffs in time for the whole force leave to that place by the middle of April.

On the subject of rations, I have only to remark, that, with an Assistant Commissary possessing the zeal and ability of Capt. Brown, and in a country abounding in provisions, as the state of Missouri is known to be, and of the cheapest and best kind, I feel convinced that the requisite supplies will be, as they have been, obtained whenever called for.

With respect, I have the honor to be,

E. P. GAINES,
Major General by Brt. commanding.

To the ACTING ADJUTANT GENERAL,
Washington City.

A true copy.

CHARLES J. NOURSE,
Adjutant General, Acting.

FORT RECOVERY,

July 21, 1823.

DEAR MAJOR: Your favor of the 10th instant I have this moment received, and I assure you, with great pleasure. I was highly gratified that Majors Woolley and Ketchum came on to join us. Mr. Pilcher I have requested to write you fully as to Indian affairs; and he is so much better informed than myself, that I shall leave that subject principally to him. He is, I find, very efficient, and has conducted greatly to my satisfaction.

These Yanctons appear to be zealously determined to co-operate with us, but I have some doubts as to the continuance of their ardor. We have been obliged to make a halt here of three days, to wait for Mr. Pilcher, and to repair damages sustained from wind and water. After so many disasters, I am happy to inform you that we are yet efficient, perhaps as much so as when we set out. Our powder was *miraculously* preserved—several casks, which were under water all night, were entirely uninjured. I have borrowed ten rifles of Mr. Pilcher, and can have twenty-three more of General Ashley, but eight only are necessary to complete—powder and lead I can obtain in ample quantities. If the Ricaras and Mandans unite, I shall proceed to the Mandans; and, if they keep the Ricaras in the village, shall attack them. We shall do our best to obtain a victory. The honor of the American arms must be supported at all events. But I can plainly perceive our force is not sufficient to inspire that degree of awe and respect among the Indians which I would wish. We make but a small show, on a large Prairie, by the side of 4 or 500 mounted Indians. If we can obtain a fair fight, our superiority will probably be more apparent.

As I have to write on the ground, in a heavy wind, I fear you will not be able to read my letter. You will, however, have the goodness to excuse inaccuracies, and my want of time and means to send you a fair copy.

I am, dear sir, truly,
Your friend and servant,

Maj. B. O'FALLON.

H. LEAVENWORTH,
Col. U. S. Army.

A true copy.

Chas. J. NOURSE, *Adj. Gen. Acting.*

HEAD QUARTERS, WESTERN DEPARTMENT,

September 9, 1823.

GENERAL: I have received, through your aid-de-camp, Lieut. E. Kirby, your letter of the 25th, in reply to mine of the 10th of last month.

Not having received an acknowledgment of the receipt of mine of the 26th July, I was induced to make inquiry at the post office, where I found that the mail robbed near Lexington, in this state, about the 28th of July, (an account of which I presume you must have seen in the newspapers) must have contained the letter in question. Apprehending, therefore, that it was purloined by Mr. Hanover, alias Rees, I send herewith a duplicate, omitting the copy of a letter from Major O'Fallon, and that from Major Foster, the former having passed through the newspapers, with the substance of the latter.

Deeming the subject to be an important one, I fortunately transmitted to the Department of War, on the 28th of July, copies of my letter and its enclosures, the receipt of which has been acknowledged. I therefore send you the enclosed, merely to assure you that I had not omitted to give you early information of my measures.

Very respectfully, I have the honor to be,
Your obedient servant,

E. P. GAINES,
Major Gen. by brevet, commanding.

Major Gen. BROWN,
Washington.

A true copy:

Chas. J. NOURSE,
Adjutant General, acting.

HEAD QUARTERS, WESTERN DEPARTMENT,
Louisville, Ky. July 26th, 1823.

GENERAL: The report made to you the 12th instant, by General Atkinson, that Gen. Ashley, with his trading company, had been attacked by the Rickaree Indians, and defeated, with the loss of fourteen killed and nine wounded, is confirmed by letters received last night from Major O'Fallon and Major Foster, of which I enclose herewith, copies numbered 1 and 2, with copies of instructions to Gen. Atkinson and Colonel Chambers, No. 3 and 4.

From Major O'Fallon's letter you will perceive that other outrages, of a similar character, have been committed by the Blackfoot Indians, who have killed Messrs. Jones and Immel. (the latter late of the army of the United States) with five other persons.

It appears that, on the 22d of last month, Col. Leavenworth marched with 220 men, regular troops, and 80 men of the trading companies, to be joined by a large party of Sioux warriors, against the Ricaras, who, being strongly fortified, the colonel took with him some cannon.

The Rickaras villages are situated about 700 miles above Council Bluffs, and are supposed to contain between 600 and 700 warriors. Should they be able to turn out 600 warriors, well armed and united, as they are reported to be, the movement of Colonel Leavenworth, taking into view the great distance, and the several intermediate nations near which he must necessarily pass, cannot but be considered as very hazardous, as any disaster on our part would be witnessed, or very soon heard of, by the numerous adjacent nations of Indians; and a repulse, attended with the loss of but few lives, would be to us a serious disaster, as it would tend to undo most of what has been done by the United States on the minds of the Indians, since the first occupancy of the posts up the Missouri.

The unprovoked outrages of the Ricaras call for exemplary punishment; but a premature effort on our part will but widen the breach between us, and enhance the evil we thus attempt to correct.

I trust the report of Col. Leavenworth, which is not yet received, will give a more satisfactory view of his measures and prospects of success, than I am at present able to afford. I have, however, great confidence in the discretion and conduct of that officer, and I am persuaded that the circumstances of the case justified the step which he has taken. But, be this as it may, the step is taken, and the force engaged must be supported. For this purpose, I have ordered Gen. Atkinson to repair to the Missouri, where I have directed six companies of the 1st, and four of the 7th infantry, to be placed under his orders, which, with the disposable part of the 6th, he will be able, not only to support Colonel Leavenworth, but to punish the Ricaras, and arrest the progress of Indian hostility in that quarter; or, at least, to prevent its extension to the Pawnees, (said to be nearly allied to the Ricaras) and other nations east and south thereof.

Two steam boats are employed to transport the six companies of the 1st regiment from Baton Rouge to St. Louis. This will occasion an expense of about 4,000 dollars. For the payment of this sum, and to meet the expense of transportation, &c. of these companies from St. Louis, and the four companies of the 7th from Arkansaw to Council Bluffs, I have to request that the quartermaster general may be instructed to forward to the assistant quartermaster at St. Louis the sum of 12,000 dollars, which is deemed to be necessary to meet the expense of transportation, &c. which will be incurred in the movement to Council Bluffs.

Very respectfully, I have the honor to be,

E. P. GAINES,
Major General by brevet, commanding.

Major Gen. JACOB BROWN,

General in Chief, Washington.

A true copy,

Chas. J. NOURSE,

Aj't. Gen. Acting.

HEAD QUARTERS, WESTERN DEPARTMENT,
Louisville, Kentucky, July 26, 1823.

GENERAL: You will repair to the Missouri, and assume the command assigned you by my department order of this date.

The immediate object of this command is to support the detachment under Colonel Leavenworth, and to give a timely check to the hostile spirit which has recently manifested itself among the Indians of the Upper Missouri, and at the same time to arrest or punish the Ricaras or other warriors by whom *thirty-three* of our citizens have recently been killed or wounded.

Six companies of the 1st Infantry, under Colonel Chambers, are this day instructed to join you at St. Louis, to act under your orders; to which will be added, should it be advisable, four companies of the 7th Infantry.

These will be directed to be held in readiness, subject to your orders, to join you at such time and place as you may find it necessary to direct.

Should the information which may reach you at or beyond St. Louis, in your judgment, suggest the propriety of your being supported by an additional force, you will, in this event, make application to the Governor of the State of Missouri for a few companies, or if necessary a battalion, of Volunteer Mounted Riflemen: but it is not expected that this force will be required, without satisfactory evidence should meet you of some new act of hostility on the part of the Indians, *below the Ricaras villages.*

You will order from St. Louis to Fort Atkinson a supply of subsistence and ordnance stores, which, added to those now at the post, shall be sufficient for the regular troops destined for that post, during the period of nine months from the 15th of October next, at which time the 1st Infantry should reach that post; and, should it become necessary to obtain volunteers, you will, in that event, order up additional supplies, sufficient for such additional force, during the time for which they may be employed, which should be for nine months, unless sooner discharged; and you will order the purchase of whatever subsistence may be necessary, (to supply any deficiency which may be found in the subsistence department at St. Louis,) to enable you to carry these measures into effect.

In the discharge of these duties, you will exercise a sound discretion, governing your movements and measures by the facts and circumstances which may be disclosed to you as you proceed, and by the instructions heretofore addressed to you, and in obedience to the "General Regulations of the Army."

You will keep me advised of your measures, and of the occurrences

that you may deem interesting connected with the command assigned you.

With great respect,
I have the honor to be,

E. P. GAINES,
Maj. Gen. by Brevet, Commanding.

H. ATKINSON,
Brig. Gen. U. S. Army.

A true copy.

CHARLES J. NOURSE,
Adjutant General, Acting.

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HEAD QUARTERS, WESTERN DEPARTMENT,

Louisville, (Kentucky,) July 27, 1823.

SIR: Accompanying this, you will receive orders to repair, with six companies of your regiment, to St. Louis, on board of the steam boats the Favorite and Magnet, to report to General Atkinson.

The recent hostility of the Ricaras, and other nations of Indians up the Missouri, has rendered it necessary to assemble a force on that river, to support the sixth infantry; the disposable part of that regiment having marched, a month since, against the Ricaras. Should the spirit of hostility, as there is reason to apprehend, extend itself to some of the neighboring tribes, the remaining part of your regiment will, in that case, after receiving recruits for completing the regiment, be ordered to follow you.

For the present, however, you will leave Lieut. Col. Taylor in command, who will probably be joined by two companies of the fourth infantry.

General Atkinson will enclose to you the agreements made by him with the steam boats for your transportation, to which you will require particular attention on the part of the commanders, as well as on the part of the troops.

I regret to find that the principal part of your subsistence has been hauled out to your summer cantonment. You will not, however, delay your movement so long as to bring back any part of that supply, as most of it will be wanted out there; and, as subsistence can be obtained on the lowest terms at St. Louis, it is not desirable that you should take with you the quantity mentioned in my order of yesterday.

day's date. You need not take with you more than a supply for one month or six weeks.

Wishing you health, &c.

I have the honor to be,

Your obedient servant,

E. P. GAINES,

Major General by brevet, commanding.

Col. CHAMBERS,

First United States' Infantry.

A true copy.

CHARLES J. NOURSE,

Adjutant General, Acting.

HEAD QUARTERS, WESTERN DEPARTMENT,

Near Louisville, (Ky.) September 13, 1828.

SIR: You will receive, herewith, for the information of the General in Chief, a copy of a letter from General Atkinson, dated at St. Louis, the 5th instant, reporting the arrival at that place, of the six companies of the 1st infantry, destined for the Upper Missouri.

I regret that it is not in my power to communicate the result of the expedition under Colonel Leavenworth; nothing having been received by me from that officer, since the date of the letter referred to in mine of the 30th of last month.

Respectfully, I have the honor to be, &c.

E. P. GAINES,

Major Gen. by brevet, commanding.

To the ADJUTANT GENERAL U. S. ARMY,

Washington City.

A true copy.

CHARLES J. NOURSE,

Adjutant General, Acting.

HEAD QUARTERS, RIGHT WING, WEST. DEPT.

St. Louis, 5th Sept. 1823.

SIR: I have the honor to inform you, that two companies of the 1st regiment under Major Whartenby, arrived at this place, from Baton Rouge on Friday evening last, and that four companies came up on Tuesday, under Colonel Chambers.

The whole are now encamped a short distance above the city, where they will remain for three days more, when they will take up their movement for Council Bluffs.

I have not heard of Colonel Leavenworth since I addressed you on the 19th ult. enclosing copies of letters from him and from Mr. Pilcher to Major O'Fallon. I calculate, however, on hearing, in less than a week, the result of his enterprise against the Arickara Indians, which will determine me with regard to pushing Col. Chambers's detachments through by land. In the mean time, I have prepared transport boats, and shall send off the detachment, with their provision and stores, by water, as I shall have it in my power to detach, at any time, a command from the boats, to be pushed on by land, should circumstances above render it necessary. I have adopted this mode, because, if the troops transport their own supplies, it will save to the United States some \$6,000; and the fact of their setting out by water will retard their arrival at the Bluffs but a little, should the state of affairs in the upper country make it necessary that they should ultimately go by land, as all the progress by water will so much shorten the distance.

The detachment, as you will see by the enclosed report, is weaker than you anticipated—forty-five are reported sick, but none are seriously indisposed, except the Adjutant. All the men will be able to move with the detachment.

The detachment is deficient in many articles of clothing, particularly shoes, a supply of which, I fear, must be purchased here, as the men cannot ascend the river barefooted.

Every thing justifies a belief that Colonel Chambers's movement will be as prompt and successful as you anticipated. Late advices from the Upper Mississippi represent every thing to be tranquil in that quarter.

Some letters and returns from thence, addressed to me, are sent to you, under cover, by Lieut. Russell, who will deliver this communication.

I will avail myself of every opportunity to keep you advised of every circumstance of interest within my command.

With very great respect, sir, I have the honor to be, your obedient servant,

H. ATKINSON,
Br. Gen. U. S. Army.

MAJ. GEN. E. P. GAINES,
U. S. Army, Louisville.

A true copy:

CHS. J. NOURSE, *Ad't. Gen. Acting.*

HEAD QUARTERS, WESTERN DEPARTMENT,

September 22d, 1823.

SIR: By yesterday's mail, I forwarded to the Adjutant General's Office, a copy of Colonel Leavenworth's report, of the satisfactory result of his expedition against the Ricaras, intending to transmit to you, by the same conveyance, the original articles of a treaty of peace entered into by him, with that nation; but, I had omitted to allow myself time, prior to the departure of the mail, to prepare or obtain copies of the papers which appeared to be proper should accompany the treaty: and I have now the honor to enclose them herewith, viz:

No. 1. The report of Colonel Leavenworth.

*No. 2. The treaty with the Ricaras.

No. 3. The order of Colonel Leavenworth, noticing the conduct of the officers and men of his command on the expedition.

No. 4. Letter addressed by Colonel Leavenworth to the Ricaras, after they had abandoned their villages.

No. 5. Letter from General Atkinson, dated September 13, 1823.

I have directed General Atkinson to take measures to ascertain the temper and views of the Sioux, and their motives for abandoning our troops at the time when their presence and aid were most wanted, and to keep an eye upon Mandans and Ricaras. I have also directed him to make his arrangements with a view to the chastisement of the Blackfoot Indians in the course of the ensuing season: A measure which appears to me to be essentially necessary for the protection of our citizens engaged in the Indian trade, as well as our exploring parties in that quarter. Should this measure be approved, I cannot but think it proper, that the 1st regiment of infantry should take post at Council Bluffs for the winter.

Abundant supplies of beef and pork may be driven to that place in the month of November next, and there salted and dried, for the expedition; and a sufficient quantity of corn may at the same time be kiln dried or parched, to supply any deficiency in the article, even should the river freeze up before the supply now in possession of the troops at Belle Fontaine should reach the Bluffs, which is doubtful. But, of this article, the present year's crop of wheat at the Bluffs, is reported to be sufficient for two hundred barrels of flour. Hence, the actual deficit to be supplied by corn, raised at the place, (of which there is a promising crop) will be inconsiderable. The troops being thus enabled to leave the Bluffs at the first approach of good weather, after the breaking up of the ice in the spring, will have full time to effect the objects of the expedition before the return

* Since writing this letter, I regret to find, that I have either mislaid, or, in the hurry of preparing for the last mail, enclosed the *original*, in place of a copy of the Ricaras treaty, to the Adjutant General's Office.

E. P. G.

of cold weather. They can, moreover, attend better to every preparation for the expedition at the Bluffs, than at Belle Fontaine, where the evils of grog-shops, desertions, &c. &c. will lessen the efficiency of the troops, and retard every measure of preparation.

With the greatest respect,

I have the honor to be,

E. P. GAINES,
Maj. Gen. by brevet, Commanding.

Honorable JOHN C. CALHOUN,
Secretary of War.

A true Copy.

CH. J. NOURSE, *Adjt. Gen. Acting.*

No. 1.

HEAD QUARTERS, 6TH REGIMENT,

Fort Atkinson, August 30, 1825.

SIR: I have the honor to inform you, that the troops who lately visited the Ricara towns, returned to this post on the 27th instant.

We arrived before the Ricara towns on the 9th of the present month. The Sioux Indians who were with us, were met by the Ricaras a short distance from their towns, and a skirmish took place between them. The Ricaras maintained their ground, or rather drove the Sioux back, until the regular troops, and General Ashley's men, arrived, and formed their line. The Ricaras were then immediately driven into their town. The Sioux were so much scattered in front of the troops, that the latter were unable to deliver their fire without killing some of the Sioux, and therefore did not fire.

Our boats arrived subsequently, during the evening of the 9th, and our artillery was disembarked. On the morning of the 10th, Capt. Riley, with a company of riflemen, and Lieut. Bradley, with a company of infantry, were ordered to take possession of a hill above the upper village. They immediately took a position there, within one hundred steps from the town, and in a position which screened them from the fire of the enemy from the towns. At the same moment, Lieut. Morris, with one six pounder and a five and a half inch brass howitzer, commenced an attack on the lower town. Sergeant Perkins, with one six pounder, was sent to report to Mr. Vandenburg, of the Missouri Fur Company. This six pounder was placed above the upper village. A brisk fire was continued upon the towns until three o'clock in the afternoon. The Sioux were, in

the mean time, busily engaged in gathering and carrying off the corn of the Ricaras.

At eight o'clock, Major Ketchum was also ordered to the upper village with his company. Between three and four o'clock, the six pounder, and the troops opposed to the upper village, were withdrawn, and our whole force concentrated below the lower village, and the troops ordered to form for the purpose of collecting corn for their own use, as General Ashley's men had then been destitute of provisions for two days.

At this time, a party of Sioux and a party of Ricaras, both on horseback, were discovered holding a parley on the hill beyond the upper town. It was also discovered that the Sioux were going off, though they had given no intimation of an intention to do so. The Ricaras sent out and begged for peace. They said that the first shot from our cannon had killed the celebrated Chief, called "Grey Eyes," who caused all the mischief, and that we had killed a great many of their people and of their horses. They were evidently very much terrified, and completely humbled. Being convinced of this, and supposing that the government would be better pleased to have those Indians *corrected* than *exterminated*, and, as the Sioux, amounting to about seven or eight hundred warriors, had left us in a very strange and unaccountable manner, it was thought best, under all the circumstances of the case, to listen to the solicitations of the Ricaras for peace, especially as it was understood that our round shot were nearly all expended; consequently, a treaty was made with them, a copy of which is enclosed. In making this treaty, I met with every possible difficulty which it was in the power of the Missouri Fur Company to throw in my way; and, as Mr. Pilcher, their acting partner, had been appointed as special Sub-Agent, to raise the Sioux against the Ricaras, he was able to give me great trouble.

In restoring to General Ashley the property taken, it was thought that the Indians did not perform their engagements on that subject as well as they were able to do, and they were threatened with an attack. Their principal Chief, (The Little Soldier,) came to us, and begged permission to withdraw his family from the village before we attacked, and he gave us the most conclusive evidence of his friendly disposition towards us. It was now late in the afternoon of the 12th. The 10th and 11th having been spent in action and in negotiation and interchanging visits, our men frequenting the towns for the purpose of trading for Mockasins, &c., and the Indians manifesting every symptom of having been thoroughly brought to a sense of their interest and duty, it was concluded to postpone the attack until morning, and the troops were dismissed from parade.

It had been ascertained by me, that the Indians were so much alarmed by our threatening to again attack them, that they would probably run away and leave their villages. This, it was thought, would have an unfortunate effect upon the Indians, and make them more inclined to commit depredations upon the traders; and, as the Little Soldier soon after sent out for General Ashley a few more

buffalo robes, with a message that he could not possibly do more, and begging that we would have pity on them, I sent him word that I would not attack them; that it was not their property that we wanted; to make his people feel safe, and conduct themselves well, and they should not be hurt.

Early on the morning of the 13th, we found the Ricaras had left their towns during the night.

Major Ketchum, with his company, and company E, commanded by Lieut. Bradley and Lieut. Morris, with one six pounder, were ordered to take possession of the towns, and to suffer not the least article to be taken away, or the towns to be injured. A message was sent to call back the Indians, if possible, and to induce them to take possession of their towns, but they could not be found. It was evident that our artillery had been served with very great effect. The towns had been completely riddled. We found thirty-one new graves, and we found that several old ones had been opened, and the surface set thick with prickly pears to conceal the new dirt. We know that ten men, who were killed by the Sioux in the skirmish on the ninth, were buried in five graves; and we know also, that more than one was buried in several of the other graves. From the best evidence which we could collect, it is supposed that more than fifty of their people were killed, and a great number wounded. Our messengers returned on the evening of the 14th, without having been able to find the Ricaras.

On the morning of the 15th, we placed the mother of the late chief "Grey Eyes" (an aged and infirm woman, whom they had left in their flight,) in one of the principal lodges of the lower village, gave her plenty of provisions and water, and left her in the quiet possession of the towns and the property left by the Indians, except some corn, which had been taken for the subsistence of the men. At about ten o'clock on the morning of the 15th, the troops were embarked to descend the river, and our guard withdrawn, and every soul removed from the villages, except the woman before mentioned. All the boats were got under way nearly at the same time.

Before we were out of sight of the towns, we had the mortification to discover them to be on fire.

There is no doubt but they have been consumed to ashes. Nor is there any doubt but that they were set on fire by one McDonald, a partner, and one Gordon, a clerk of the Missouri Fur Company.

If the nation has been deprived of the advantages which might have resulted from the magnanimity of her troops towards a fallen and an humbled enemy, it is chargeable to that company, or to those individuals, who set those towns on fire. Had not this been done, there is no room to doubt but that the Ricara Indians would in future have behaved as well towards our countrymen as any other Indians on the river. It is now my deliberate opinion that those Indians will be excited to further hostilities if in the power of the Missouri Fur Company to effect it. It is understood that the company have withdrawn their trade from above the Sioux country. Not so with Messrs.

Ashley and Henry; they have a small number of men and a large amount of property at the mouth of the Yellow Stone river, and they were deeply interested in the correction and pacification of the Ricaras. Their zeal and efficiency in aiding to chastise those Indians, was conspicuous and highly honorable, and could have been excelled by nothing but the zeal of the Missouri Fur Company to prevent a pacification of them after they were chastised and humbled into the dust.

We found the Ricara Indians in two villages: the lower one containing seventy-one dirt lodges, and the upper village seventy dirt lodges; each village was enclosed with palisades or pickets, and a ditch; and the greater part of the lodges had a ditch around the bottom on the inside. These works, however, had been represented to be much stronger than what we found them to be.

During our operations, we sustained no loss in men, and had but two wounded: Hugh Johnson, of Gen. Ashley's command, and Smith, a private of Major Ketchum's company.

Our officers and men have returned in fine health and spirits, and it is well: for those left here are nearly all sick. Capt. Fowle arrived here with 85 men (recruits) on the 28th instant.

Our spring wheat has done well, and all our crops are very good. No material losses will be sustained by our absence. In ascending the river, we lost one boat, and seven men drowned, and had another boat sunk by a storm. We lost one swivel and some ammunition, and some provisions. A particular account of all which shall be soon forwarded, together with a statement of every item of expense.

I have been highly gratified with the officers and men of the regiment, and also with General Ashley, and his command of eighty men, and intend to do myself the honor to make a more detailed and circumstantial account of all our proceedings, and of what was done by each, and hope that what has been done will meet the approbation of our superior officers, and of the Government.

I have the honor to be,

Very respectfully,

Your obedient servant,

H. LEAVENWORTH,
Colonel, commanding 6th regiment.

A true copy.

CHARLES J. NOURSE,
Adjutant General Acting.

No. 3.

HEAD QUARTERS 6th INFANTRY,

Fort Atkinson, 29th August, 1823.

ORDERS.

The Colonel Commanding is happy to announce to his command, that the objects of the late expedition against the Ricaras Indians have been effected. The blood of our countrymen has been honorably avenged, the Ricaras humbled, and in such a manner as will teach them, and other Indian tribes, to respect the American name and character.

In effecting these objects, the duties which have been performed by every part of the regiment, as well those left at this post as those who ascended the river, have been arduous in the extreme; but those duties have been performed with a zeal, cheerfulness, and efficiency, which is highly honorable to them, and which entitles them to the approbation of their country.

Where all have done well, and all have been zealous to contribute their whole and entire power to promote the public service, it is as delicate as it is difficult to mention individual instances; but that the combination of circumstances has enabled some to perform more than others, cannot be doubted. The Colonel commanding has been highly gratified with the promptness and alacrity manifested by Maj. Woolley and Brevet Major Ketchum in joining the expedition, and equally so with their subsequent conduct.

The efficiency of Capt. Armstrong's company, and energies of his men, have been preserved in an eminent degree. The captain has manifested his usual skill in the management of his company, and has given every reason to place the greatest confidence in the physical strength and force of his company: in this respect, he has satisfied his commanding officer.

With Captain Riley, the colonel commanding has been highly pleased; he has been skilful, discreet, and successful, in the management of his men and the boat, and the public property committed to his charge. His efficiency and promptness in the execution of orders has been conspicuous and highly honorable to him.

Doctor Gale has not only performed his duty to the entire satisfaction of the commandant, but he has done more—he has frequently volunteered his services to perform important duties, and particularly in saving the property in the large boat, when she was sunk by a severe storm at night; he effected much, and in a manner highly gratifying to all who knew the circumstances. Although Lieutenant Wickliffe had the misfortune to lose the boat which was committed to his charge, it has been evident that his zeal for the good of the public service has been equal to that of any other gentleman with the expedition.

In every situation in which Lt. Bradley has been placed, he has given entire satisfaction, and would, no doubt, had he been put to a more severe trial.

To the gentlemen of the staff, generally, the commandant returns his thanks. Lieutenant Cruger has performed the duties of Quartermaster and Assistant Commissary in the most correct and acceptable manner; and, in addition, rendered important service, by volunteering his services as an extra adjutant to the Missouri Legion during our operations.

Lieut. Noel, in discharging the duty of Adjutant, has given the most entire satisfaction, and the fullest evidence of his ability to perform still more important service.

It has fallen to the lot of Lieut. Morris to perform the most important duties; and he has done so in a manner which cannot be too highly commended. When our boats were lost, and much of our ammunition either lost, or damaged in a great degree, we found it replaced, and well prepared by the activity and attention of Lieut. Morris, and that, too, without delaying the expedition a single hour. The Lieutenant's management and direction of the artillery would have done honor to a master of the trade.

The men who were attached to the artillery have deserved notice, and the approbation of their country. They have that of the colonel commanding, in a high degree, particularly Sergeants Lathrop and Perkins, the former of whom, with one of the six pounders, made very superior shots.

The colonel commanding cannot dismiss this subject, without again mentioning his very great satisfaction with the gallant and honorable conduct of General Ashley and his brave and hardy little corps of mountaineers. Although for several days entirely destitute of subsistence, they persevered in "noble daring" without a murmur. The colonel commanding only regrets that he can offer them nothing more substantial than his thanks.

H. LEAVENWORTH,
Col. Commanding.

A true copy:

C. H. S. J. NOURSE,
Adjutant General, Acting.

No. 4.

HEAD QUARTERS, MISSOURI LEGION,

Ricaras Towns, August 14, 1826.

Colonel Leavenworth, commanding the 6th regiment, to the Chiefs and Warriors of the Ricaras nation of Indians, Greeting:

RICARAS:

You see the pipe of peace which you gave to me, in the hands of Mr. Charlonneau, and the flag of the United States.

These will convince you that my heart is not bad. Your villages are in my possession; come back and take them in peace, and you will find every thing as you left them. You shall not be hurt if you do not obstruct the road or molest the traders. If you do not come back, there are some bad men and bad Indians who will burn your villages. Come back, and come quickly. Be assured that what I say is the truth.

H. LEAVENWORTH,
Colonel U. S. Army.

A true copy:

Chas. J. Nourse,
Adjutant General, Acting.

No. 5.

HEAD QUARTERS, RIGHT WING, WEST. DEP.
St. Louis, Sept. 13th, 1823.

GENERAL : I have the honor to inform you, that an express reached me this morning, from Col. Leavenworth, who returned to Council Bluffs on the 27th ultimo, from his expedition against the Ricara Indians. I send to you by express, his report, and the articles of a treaty made with the Ricaras. Those papers contain all the official information that has come to hand.

Although the Ricaras have been severely punished, and have sued for peace, I am of opinion, that they are decidedly averse to such a measure, and will, no doubt, on the first occasion, recommence hostilities, as their conduct subsequent to the treaty plainly shews.

The Sioux appear also to be highly displeased, owing, I understand, to Col. Leavenworth's not prosecuting hostility against the Ricaras till they were all exterminated, which the Sioux expected, (and were, possibly, promised,) with possession of the village, scalps, horses, &c. They, at any rate, deserted Col. Leavenworth at a critical moment, without giving any reason, and in a bad humor. They may not commence a war with us, yet such a course is not altogether improbable. We must, at least, watch them narrowly. I have no idea that hostility will reach our frontier settlements, but I am clearly of opinion that the Missouri will be shut against us, from the Ricaras up, and possibly by the Sioux, if an imposing military force does not visit that country the next season. Therefore, I would suggest, that at least another regiment should be sent to join the 6th early in the spring, with recruits to fill both corps, with a view to detaching six

or seven hundred men, to ascend as far as the Yellow Stone. They may return the same season, or establish themselves above, as circumstances may dictate.

Upon the receipt of the communications from Col. Leavenworth, I have, in conformity with your orders and the instructions of the Secretary of War, ordered the detachment of the first regiment to halt at Belle Fontaine, where the barracks will be repaired, and the troops quartered for the winter. Although I think their presence at the Council Bluffs, this fall, would have a good effect, yet I do not deem it indispensable; for they can arrive as early in the spring as supplies can for them, and, until the arrival of which, they could not move up the river. Besides, the 6th regiment is already strengthened by Capt. Fowle's land detachment, and the recruits that ascend the river will also join it—making a force sufficient for the defence of the post at Council Bluffs, and to overawe the neighboring tribes. I shall, however, upon any case of emergency, be able to march with great promptness the detachment of the first to the upper country, where, from the products of our crops, they can be provisioned till spring.

I shall remain at this place, till the return of the express from Louisville; say twelve days, when I propose, by your advice, to set out for Council Bluffs. I shall be able, by visiting that post, to acquire the best information relative to the feelings and views of the Indians, and can return to this place in December, to attend to any preparations for operations in the spring, that circumstances may require.

I am so deeply impressed with a conviction of an unfriendly and an unsettled state of feeling among the upper tribes, that I can but repeat my opinion of the necessity of sending an imposing force into that quarter the ensuing spring.

With very great respect, Sir,
I have the honor to be,
Your most obedient servant,
H. ATKINSON,
Brig. Gen. U. S. A.

Maj. Gen. E. P. GAINES,
Commanding Western Department,
Louisville, Ken.

A true copy.

Chas. J. NOURSE, *Adj. Gen. Act'g.*

HEAD QUARTERS, WESTERN DEPARTMENT,

Louisville, Ky. September 21, 1823.

ORDERS.

The Commanding General takes great pleasure in announcing to the troops of his department, the handsome and honorable result of the late expedition under Colonel A. Leavenworth, against the Ricaras nation of Indians.

These Indians, occupying a strong position on the Missouri River, near 700 miles above the Council Bluffs, with their three principal villages fortified, and defended by upwards of 600 warriors, "well armed with British fusils," having, in the month of June last, made an unprovoked and wanton attack on the Trading Company, under General Ashley, in which they killed and wounded 28 American citizens, peacably employed in an authorized trade; leaving their surviving associates 900 miles distant from the inhabited part of the United States, destitute of every prospect of timely succor, robbed of the proceeds of a year's peril, labor, and enterprise, and exposed to the horrors of famine and additional savage outrage:

Under all these untoward circumstances, the distinguished Col. Leavenworth, then in command of Fort Atkinson, on hearing of the disaster of his countrymen, without pausing to count the numbers opposed to him, or to calculate the various obstacles that so wide a range of dreary wilderness presented, immediately embarked for the scene of action, with his disposable force of the 6th Infantry, consisting of but 220 officers and men. After a toilsome movement of 45 days, against the rapid current of the Missouri, he arrived on the 9th ultimo before the enemy's villages, each of which he found to be enclosed with palisades and ditches. A few days prior to his arrival, he was joined by General Ashley, with the remnant of his party, amounting to 80 men, and by Mr. Pilcher, with 40 men, of the trading companies, together with near 600 Sioux, who professed to be friendly. With these volunteers, aided by his little band of regulars, Colonel Leavenworth, soon after his arrival, commenced his operations against the enemy. In approaching the villages, with the Sioux in advance, they were met by the Ricaras, a short distance below their works, where a skirmish ensued, in which the enemy sustained his position, and forced the Sioux back, until the regular troops, aided by Gen. Ashley's volunteers, arrived, and formed the line of battle, when the Ricaras were immediately driven into their villages. During the evening of the 9th, the boats arrived, and the artillery was disembarked. On the morning of the 10th, Captain Riley, with a company acting as Riflemen, and Lieutenant Bradley with a company of Infantry, were posted on a hill, within 100 yards of the upper village, where they were enabled to annoy the enemy without being exposed to his fire. At the same moment, Lieut. Morris, with one six pounder and a five and a half inch howitzer,

commenced an attack on the lower town. Sergeant Perkins, with a six pounder, was ordered to co-operate with Major Vandeburg, of the volunteers. This six pounder was placed above the upper village. At eight o'clock, Major Ketchum was also ordered to the upper village. These arrangements resulted in the severe chastisement of the enemy, who, after having their palisades and houses literally riddled, and suffering a loss, which the Colonel estimates at "fifty killed and a great number wounded," they, at seven o'clock in the afternoon of the 10th, begged for peace, which was granted, on condition that they would restore the whole of the property taken from the traders, and, in future, conduct themselves peaceably and correctly. They, however, complied but in part with their promise to restore the plundered property, and, fearing additional punishment, or desirous of obtaining succor from the neighboring tribes above them, they availed themselves of the darkness of the night of the 12th to desert their villages; nor were they again seen during the two following days in which the troops remained on the ground.

Of the regular forces under Col. Leavenworth, he reports Sergeant Stackpole, (a brave and experienced soldier of Chippeway, Niagara, and Fort Erie,) with six privates drowned, and one private wounded in action; of General Ashley's volunteers, Hugh Johnson was wounded.

The friendly Sioux took no part in the action of the 10th; but, to their shame and disgrace, occupied themselves during the time in plundering the enemy's cornfield, and, before the close of the action, a party of them were seen in conference with a party of the enemy. They soon after abandoned our troops without assigning any reason for their conduct. Such auxiliaries are not to be trusted, without a regular force of superior numbers, sufficient to restrain and coerce them.

The commanding general takes this occasion to tender his thanks to Colonel Leavenworth, his officers and men, and to General Ashley and his volunteers, for the promptitude, sound discretion, skill, and gallantry, with which the expedition was conducted and executed. The officers employed on the expedition, and particularly noticed by Col. Leavenworth, were, Major Woolley, Brevet Major Ketchum, Captains Armstrong and Riley, Doctor Gale, Lieutenants Wickliffe, Bradley, Cruger, Noel and Morris, with Sergeants Lathrop and Perkins.

The general directs, that in all cases when an enlisted soldier hereafter falls in action, is wounded, or dies, in the honorable discharge of his duty, his christian name, former place of residence, age, and general character as a soldier, shall be reported to the general by the captain or commanding officer of the company to which such soldier belongs.

By order of Major General Gaines.

R. LOWNDS,
Aid-de-camp.

A true copy.

CHARLES J. NOURSE, *Adj't. Gen. Act.*

HEAD QUARTERS, WESTERN DEPARTMENT,
October 16, 1823.

SIR: In compliance with the wishes of General Atkinson and Colonel Leavenworth, I have to request your attention to the communication of the latter, enclosed herewith.

I am decidedly of the opinion that the conduct of the colonel, with that of his officers and men, was such as to merit marked applause; and that if the President of the United States should be pleased to confer any token of his approbation on either of the officers engaged in the late expedition, Colonel Leavenworth himself has a well founded claim to the first notice.

It is reported that Mr. Pilcher, agent to one of the Missouri trading companies, and at the same time sub-agent for Indian affairs, has undertaken to censure Colonel Leavenworth, upon the ground of his having made a treaty with the Ricaras before they had been properly chastised.

Upon this subject, it may be remarked, that Colonel Leavenworth, by virtue of his command, and pursuant to the law of nature and of nations, had a right to decide as to the measure of punishment due to the enemy, and to dictate to him terms of capitulation; subject, of course, to the approval or disapproval of the proper authorities above him: nor is it to be apprehended that his government or country will be likely to blame him for having abstained from a sanguinary measure. The victory most acceptable to an enlightened and virtuous nation, is doubtless that which is obtained at the least expense of blood.

With great respect,

I have the honor to be,

E. P. GAINES,
Maj. Gen. by Brevet, Commanding.

The Hon. JOHN C. CALHOUN,
Secretary of War.

A true copy,

CHARLES. J. NOURSE,
Adjutant General, Acting.

FORT ATKINSON, Sept. 7, 1823.

SIR: I feel it to be a duty to recommend to the particular notice of the Government, Captain Riley and First Lieutenant W. W. Morris, for their good conduct and efficiency during the late expedition against the Aricaras.

Captain Riley has done all that any man could do, and, by his skill and good management, saved much of the public property. He has performed every duty in that prompt and soldier-like manner, which is so well calculated to ensure success and honor to our arms, and which has greatly contributed to our success.

His conduct was, also, highly distinguished for gallantry and correctness, during our late war with Great Britain, and undoubtedly merited the approbation of his country. It is hoped and believed, that the Government will be happy to take this opportunity to do him justice, in manifesting their approbation of his good conduct, by conferring on him the brevet rank of major in their army.

The services of Lieut. Morris were highly important, and they were performed in the best possible manner. His activity and cleverness in preparing our ammunition, greatly contributed to the success of the expedition. In the management of our artillery, he was extremely fortunate. His shots were made with the greatest accuracy and effect. His first shot killed the celebrated and mischievous chief of the Aricara nation, called Grey Eyes; and his second shot cut down the flag of that nation, which they called their *Medicine* flag, and in which they had great confidence. This had the happiest effect.

The whole of the Lieutenant's conduct, during the expedition, was marked by the greatest skill, promptness, and efficiency, and I hope, most sincerely, that he may receive evidence of the approbation of his country, in the brevet rank of captain in the army.

Lieutenants Bradley, Cruger, and Noel, have deserved well of their country, and it would afford me great pleasure to have them also receive evidence of the approbation of the Government; but it was not their good fortune to have an opportunity to render as important services as either Captain Riley or Lieut. Morris.

I have to request that you will be pleased to forward this communication, through the proper channel, to the honorable the Secretary of War.

Should my intermediate superiors think proper to express their approbation of the measures herein recommended, it would afford me great pleasure to have them do so.

I have the honor to be, Sir, with great respect,
Your obedient servant,

H. LEAVENWORTH,
Colonel, commanding 6th Regiment.

To Brig. Gen. H. ATKINSON,
Com'g right wing Western Department.

A true copy.
CHARLES J. NOURSE,
Adjutant General, Acting.

ADJUTANT GENERAL'S OFFICE,

Washington, July 26, 1823.

SIR: I am directed by Major General Brown, to acknowledge the receipt of your letters of the 12th and 13th inst. reporting the attack, by the Ricaras Indians, on General Ashley's trading party, &c.

These letters have been submitted to the President, and he instructs the General to express his entire approbation of the measures taken, in consequence of these hostilities. This outrage is much to be regretted, but an Indian war is not expected to ensue, and the General has no doubt that Colonel Leavenworth's movement will entirely disperse this body of misguided savages, and restore tranquillity to that frontier. Should these anticipations be disappointed, and hostilities be persevered in, he relies upon you to take such prompt and energetic measures as the nature of the case may require.

I have the honor to be,

Sir, with great respect,

Your obedient servant,

E. KIRBY, *Aid-de-Camp.*

Brigadier General H. ATKINSON,

Com'g Western Department U. S. Army,

Louisville, Kentucky.

A true copy.

CHARLES J. NOURSE,

Adjutant General, Acting.

ADJUTANT GENERAL'S OFFICE,

Washington, August 25, 1823.

SIR: I am directed by Major General Brown to acknowledge the receipt of your letter of the 10th instant, reporting that you have deemed it proper to suspend your movement to Washington. In reply, the General directs me to say, that the measures you have taken in relation to the Indian hostilities within your department, so far as they have come to his knowledge, meet his approbation, and he submits it to yourself to fix upon the time when you will avail yourself of his orders of the 24th July, to repair to Washington.

I have the honor to be, Sir, with great respect,

Your obedient servant,

E. KIRBY, *Aid-de-camp.*

Maj. Gen. GAINES.

Com'g Western Department U. S. Army,

Louisville, Kentucky.

A true copy,

CHARLES J. NOURSE,

Adjutant General, Acting.

PHILADELPHIA, 24th September, 1823.

SIR : I received, at New York, on my return from a tour to the North, your communication of the 24th August, together with a letter to the Adjutant General of the 1st September, and their several enclosures.

I approve entirely of the measures which you have adopted in relation to the prosecution of hostilities with the Indians. The position which you occupy gives you a view of the whole ground, and enables you to judge better than any other person of the course necessary to be pursued. You are, I know, aware how much this species of warfare is to be deprecated, and will use every expedient to terminate it with as little delay and expense as possible.

With great respect,

I am, your obedient servant,

JAC. BROWN.

Maj. Gen. GAINES,
Com. Western. Dep.

A true copy.

Chs. J. NOURSE,
Adj. Gen. Acting.

ADJUTANT GENERAL'S OFFICE,

Washington, 10th Oct., 1823.

SIR : I have the honor to acknowledge the receipt of your communication of the 21st ult., and its enclosures, detailing the operations of Colonel Leavenworth's party against the Ricara Indians.

These papers have been submitted to the General in Chief, who directs me to express to you his high satisfaction with the success of the expedition, and his approbation of the conduct of Colonel Leavenworth and his officers, to whom he desires you to convey his thanks for the zeal and activity which they have displayed upon this occasion.

The destruction of the Ricara villages is very much to be regretted, as tending to counteract the good effect of the expedition, and on many other accounts; but the General is happy to observe, that neither the commanding officer, nor any part of the troops of the United States, is liable to censure for that occurrence, as it appears to have been the act of the agent of the Missouri Fur Company, who, he is

sorry to perceive, so illly seconded the efforts of Colonel Leavenworth to bring the affair to a successful and amicable termination. He is, at the same time, pleased to notice the good understanding and co-operation which existed between General Ashley's party and the troops, which contributed to the successful result.

It is deemed unadvisable to take any further steps at present towards chastising the Black Foot Indians for the outrages which they have committed. The General therefore directs, that, if the six companies of the 1st infantry on the Missouri have not yet ascended the river, they be posted at Belle Fontaine till further orders, and that the four companies of that regiment at Baton Rouge remain where they are.

Should Colonel Chambers have proceeded to Council Bluffs, he will remain there through the winter.

I have the honor to be, &c.

E. KIRBY,

Aid-de-Camp.

Note.—Your communication to the War Department, of the 22d ult. has been referred to the Major General, who directs me to say, the views contained in the foregoing letter have the sanction of the President.

E. KIRBY.

Maj. Gen. GAINES,

*Com. Western Dep. U. S. A.
Louisville, Ky.*

A true copy.

Cms. J. NOURSE, *Adj. Gen.*

ADJUTANT GENERAL'S OFFICE,

Washington, November 8, 1823.

SIR: I am directed by the General in Chief to inform you, that your communication to the War Department, of the 16th ultimo, has been submitted to the President, who has decided, that, though he highly appreciates the meritorious conduct of the officers engaged in the expedition against the Ricaree Indians, yet, for various considerations, he deems it inexpedient to confer any brevets for services rendered upon that occasion.

I have the honor to be, sir, very respectfully,

Your obedient servant,

E. KIRBY, *Aid-de-Camp.*

Major Gen. GAINES,

*Commanding Eastern Department U. S. A.
Louisville, Ky.*

A true copy :

Ch. J. NOURSE, *Adj. Gen. acting.*

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Major Gen. GAINES,

Commanding Eastern Department U. S. A.

Louisville, Ky.

A true copy:

Ch. J. NOURSE, *Adj. Gen. acting.*

Abstract of the General Annual Returns of the Militia of the United States, by States and Territories, taken from the latest returns received at this Office.

STATES AND TERRITORIES.	RETURNS.		INFANTRY, GRENADIERS, LIGHT INFANTRY, AND RIFLEMEN.							CAVALRY.							ARTILLERY.							AGGREGATE.	
	For what year received.	Date of	No. of Divisions,	No. of Brigades,	No. of Regiments,	No. of Companies,	Commissioned Officers, including Division and Brigade Staff,	Non-commissioned Officers, Musicians, and Privates,	TOTAL.	No. of Regiments or Battalions,	No. of Companies,	Commissioned Officers,	Non-commissioned Officers, Musicians, and Privates,	TOTAL.	No. of Regiments,	No. of Companies,	Commissioned Officers,	Non-commissioned Officers, Musicians, and Privates,	TOTAL.						
Maine - - -	1822	20 Dec. 1822	6	12	51	465	1,794	39,505	34,299	-	-	116	948	1,064	-	-	114	1,665	1,679	57,042					
New Hampshire - - -	1823	- - -	3	6	39	392	1,408	23,939	25,347	-	-	154	1,749	1,905	-	-	40	107	1,435	1,542	58,792				
Massachusetts - - -	1822	24 Dec. 1822	7	16	662	632	2,482	45,933	48,415	6	4	237	1,766	9,003	4	51	229	3,033	3,261	58,908					
Vermont - - -	1822	- - -	4	10	35	249	1,322	20,190	21,512	-	-	133	1,429	1,563	-	-	21	84	818	902	6,976				
Rhode Island - - -	1821	15 Jan. 1822	1	4	13	106	476	7,629	8,105	-	-	31	365	396	-	-	7	31	409	440	6,942				
Connecticut - - -	1822	21 Nov. 1822	3	7	24	275	1,021	18,545	19,566	5	2	122	900	1,022	5	35	178	1,905	2,083	6,671					
New York - - -	1822	15 Feb. 1823	25	-	-	-	-	-	-	-	-	86,148	-	-	-	-	4,292	-	-	9,497	1,5037				
New Jersey - - -	1821	27 Oct. 1821	4	13	47	449	1,684	34,474	36,158	5	6	159	1,731	1,890	1	27	79	1,441	1,520	35,568					
Pennsylvania - - -	1822	13 Jan. 1823	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,308					
Delaware - - -	- - -	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Maryland - - -	- - -	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	451				
Virginia - - -	1822	Dec. 1822	5	-	128	1,011	3,305	77,995	81,300	5	11	374	7,616	7,990	5	68	198	5,064	5,262	552					
North Carolina - - -	1821	2 Jan. 1822	-	-	-	-	2,314	38,489	40,803*	-	-	121	950	1,071	-	-	-	-	-	374					
South Carolina - - -	1820	- - -	-	5	10	41	431	1,636	24,263	25,899	9	6	172	1,407	1,579	1	16	37	705	742	220				
Georgia - - -	1819	29 Jan. 1820	5	10	41	923	1,691	26,811	28,512	-	-	46	877	923	-	-	4	11	215	226	661				
Alabama - - -	1820	11 Dec. 1820	4	9	34	134	544	10,156	10,670	-	-	5	16	316	332	-	3	10	269	279	181				
Louisiana - - -	1821	19 Aug. 1822	2	5	20	148	549	9,360	9,902	-	-	7	28	297	255	-	1	4	26	32	89				
Mississippi - - -	- - -	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	91				
Tennessee - - -	1819	21 July. 1820	2	10	-	-	2,048	33,295	35,343	-	-	87	716	803	-	-	-	-	-	-	46				
Kentucky - - -	1822	18 Dec. 1822	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	89				
Ohio - - -	1822	18 Apr. 1823	10	58	107	936	3,670	77,916	81,586	4	82	146	1,875	9,021	-	11	11	708	719	26					
Indiana - - -	1819	29 Dec. 1819	5	10	24	235	911	15,636	14,567	-	-	5	21	267	288	-	3	12	123	135	90				
Illinois - - -	1818	13 Sep. 1818	-	2	4	50	116	1,915	2,031	-	-	-	-	-	-	-	-	-	-	31					
Missouri - - -	1820	- - -	-	-	-	-	31	108	1,665	1,773	-	-	-	-	-	-	-	-	-	73					
Michigan Territory - - -	1822	16 Nov. 1820	-	1	4	22	80	1,311	1,391	-	-	1	2	12	14	-	12	6	92	98	93				
Arkansas do - -	- - -	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No return.				
Florida do - -	- - -	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No return.				
District of Columbia - - -	- - -	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	No return since 1812.			

ADJUTANT GENERAL'S OFFICE, Washington, November 28, 1823.

CHARLES J. NOUISE, Adj. Gen. Acting.

Major Gen. GAINES,
Commanding Eastern Department U. S. A.
Louisville, Ky.

A true copy :
Ch. J. NOURSE, *Adj. Gen. acting.*

M.

Return of the Militia of the United States.

ADJUTANT GENERAL'S OFFICE,
Washington, November 28, 1828.

SIR: Agreeably to your directions, I have the honor of handing you, herewith, an abstract of the General Returns of the Militia of the United States, by States and Territories, taken from the latest returns on file in this office.

I would take the liberty, at the same time, of remarking the great neglect by the Adjutants General of many of the States and Territories, of the act of Congress of 2d March, 1803, as well as of the several communications addressed to them from this office, by your authority; no returns having been received from several of the States since the year 1814.

With the greatest respect,
I have the honor to be,
Your obedient servant,

CH. J. NOURSE,
Adj. Gen. Acting.

To the Honorable
SECRETARY OF WAR.

LETTER

FROM THE

GOVERNOR OF THE STATE OF MARYLAND,

TRANSMITTING A COPY OF AN ACT OF

The Legislature of said State.

ENTITLED

"An act to confirm an act of the General Assembly of Virginia," entitled "An act incorporating the Chesapeake and Ohio Canal Company."

—

FEBRUARY 2, 1825.

Referred to the Committee on Roads and Canals.

—

WASHINGTON:

PRINTED BY GALES & SEATON

1825.



IN COUNCIL, Annapolis, February 1, 1825.

SIR: In compliance with a resolution of the Legislature of this state, I have the honor to transmit to you a copy of a law, passed at the present session of the General Assembly of Maryland, entitled "An act to confirm an act of the General Assembly of Virginia, entitled 'An act incorporating the Chesapeake and Ohio Canal Company;" with a request that it may be submitted to the consideration of the honorable body over which you preside.

With great respect,

I have the honor to be,

Your obedient servant,

SAMUEL STEVENS.

The Hon. the SPEAKER

of the House of Representatives.

An act to confirm an act of the General Assembly of the State of Virginia, entitled An act incorporating the Chesapeake and Ohio Canal Company.

Whereas the General Assembly of Virginia have, heretofore, at the December session of the said General Assembly, in the year eighteen hundred and twenty-three, passed an act, entitled "An act, incorporating the Chesapeake and Ohio Canal Company," in the substance, or words following:

Whereas a navigable canal, from the tide water of the river Potomac, in the District of Columbia, to the mouth of Savage creek, on the north branch of said river, and extending thence, across the Alleghany mountain, to some convenient point on the navigable waters of the river Ohio, or some one of its tributary streams, to be fed through its course on the east side of the mountain, by the river Potomac, and the streams which empty therein; and on the western side of the mountain, and in passing over the same, by all such streams of water as may be beneficially drawn thereto, by feeders, dams, or any other practicable mode, will be a work of great profit and advantage to the people of this state, and of the neighboring states; and may, ultimately, tend to establish a connected navigation between the eastern and western waters, so as to extend and multiply the means and facilities of internal commerce, and personal intercourse, between the two great sections of the United States, and to interweave, more closely, all the mutual interests and affections that are calculated to consolidate and perpetuate the vital principles of union:

And whereas it is represented to this General Assembly, that the Potomac company are willing, and desirous, that a charter shall be granted to a new company, upon the terms, and conditions hereinafter expressed; and that the charter of the present company shall cease and determine:

SEC. 1. Be it therefore enacted by the General Assembly of Virginia, That, so soon as the legislatures of Maryland and Pennsylvania, and the Congress of the United States, shall assent to the provisions of this act, and the Potomac company shall have signified their assent to the same by their corporate act, a copy whereof shall be delivered to the Executive of the several states aforesaid, and to the Secretary of the Treasury of the United States; there shall be appointed by the said Executives and the President of the United States, three commissioners on the part of each state, and of the Government of the United States, any one of whom shall be competent to act for his respective government; the said commissioners shall cause books to be opened at such times and places as they shall think fit, in their respective states and the District of Columbia, under the management of such persons as they shall appoint, for receiving subscriptions to the capital stock of the company hereinafter incorporated, which subscriptions may be made either in person or by power of attorney, and notice shall be given in such manner as may be deemed advisable, by one or more of the said commissioners, of the time and places of opening the books.

SEC. 2. And be it enacted, That the said commissioners shall cause the books to be kept open at least forty days; and, within twenty days after the expiration thereof, shall call a general meeting of the subscribers, at the City of Washington, of which meeting notice shall be given, by a majority of the commissioners aforesaid, in at least four of the newspapers printed in Pennsylvania, Maryland, Virginia, and the District of Columbia, at least twenty days next before the said meeting; and such meeting shall and may be continued from day to day, until the business is finished; and the commissioners, at the time and place aforesaid, shall lay before such of the subscribers as shall meet, according to the said notice, the book containing the state of the said subscriptions; and if one fourth of the capital sum of six millions of dollars should appear not to have been subscribed, then the said commissioners, or a majority of them, at the said meeting, are empowered to take and receive subscriptions to make up such deficiency, and may continue to take and receive such subscriptions for the term of twelve months thereafter, and a just and true list of all the subscribers, with the sum subscribed by each, shall be made out and returned by the said commissioners, or by a majority of them, under their hands, to the Board of Public Works of this state, to the Governor and Council of the state of Maryland, to the Secretary of the state of Pennsylvania, and to the Secretary of the Treasury of the United States, to be carefully preserved; and, in case more than six millions of dollars shall be subscribed, then the sum subscribed shall be reduced to that amount, by the said commissioners, or a majority of them,

by beginning at, and striking off, a share from the largest subscription or subscriptions, and continue to strike off a share from all subscriptions under the largest and above one share, until the same is reduced to the capital aforesaid, or until a share is taken from all subscriptions above one share; and lots shall be drawn between subscribers of equal sums, to determine the number of shares which each subscriber shall be allowed to hold, on a list to be made for striking off as aforesaid; and, if the sum subscribed still exceed the capital aforesaid, then to strike off, by the same rule, until the sum subscribed is reduced to the capital aforesaid, or all the subscriptions reduced to one share, respectively; and, if there still be an excess, then lots shall be drawn to determine the subscribers who are to be excluded in order to reduce the subscription to the capital aforesaid, which striking off shall be certified on the lists aforesaid; and the said capital stock of the company hereby incorporated, shall consist of six millions of dollars, divided into sixty thousand shares of one hundred dollars each; of which every person subscribing, may take and subscribe for one or more whole shares, and such subscriptions may be paid and discharged either in the legal currency of the United States, or in the certificates of stock of the present Potomac Company, at the par or nominal value thereof, or in the claims of the creditors of the said company, certified by the acting president and directors to have been due, for principal and debt, on the day on which the assent of the said company shall have been signified by their corporate act, as herein before required: *Provided*, That the said certificates of stock shall not exceed, in the whole amount, the sum of three hundred and eleven thousand one hundred and eleven dollars and eleven cents; nor the said claims the sum of one hundred and seventy five thousand eight hundred dollars: *Provided, also*, That the stock so paid for in certificates of the stock of the present company, and of the debts due from the said company, shall be entitled to dividend only, as hereinafter provided, and that no payment shall be received in such certificates of stock, until the Potomac Company shall have executed the conveyance prescribed by the thirteenth section of this act; and provided, that, unless one-fourth of the said capital shall be subscribed as aforesaid, all subscriptions, made in consequence of this act, shall be void; and in case one fourth, and less than the whole capital shall be subscribed as aforesaid, then the said commissioners, or a majority of them, are hereby empowered and directed to take and receive the subscriptions which shall first be offered in whole shares as aforesaid, until the deficiency shall be made up, a certificate of which additional subscription shall be made under the hands of said commissioners, or a majority of them, for the time being, and returned as aforesaid.

SEC. 3. *And be it enacted*, That, whenever one-fourth, or a greater part of the said stock shall have been subscribed, in the manner aforesaid, then the subscribers, their heirs and assigns, shall be, and are hereby declared to be, incorporated into a company, by the name of the "Chesapeake and Ohio Canal Company," and may sue and be sued, and as such shall have perpetual succession, and a

common seal, and the estates, rights, and interests, of the said company, shall be adjudged and taken in law to be real estate; and it shall thereupon be the duty of the said commissioners, or a majority of them, to call a general meeting of the said subscribers, at such time and place as they or a majority of them shall appoint, after advertising the same in such public prints, as they, or a majority of them, may think proper; and such of the said subscribers as shall be present at the said meeting, or a majority of them, are hereby empowered and required to elect a president and six directors for conducting the said undertaking, and managing all the said company's business and concerns, for and during such time, not exceeding three years, as the said subscribers, or a majority of them, shall think fit; and, in counting the votes of all general meetings of the said company, each member shall be allowed one vote for every share, as far as ten shares, and one vote for every five shares above ten, by him or her held at the time, in the stock of the said company; and any proprietor, by writing under his or her hand, executed before two witnesses, may depute any other member or proprietor to vote and act as proxy, for him or her, at any general meeting: *Provided, also,* That no officer or director of said company shall, under any circumstances, be allowed to vote on any stock but his own.

SEC. 4. *And be it enacted,* That the said president and directors, and their successors, or a majority of them, assembled, shall have full power and authority to appoint, and at their pleasure dismiss, such engineer or engineers, and agent or agents, as they may deem expedient, and to fix their compensation, and to agree with any person or persons, on behalf of the said company, to cut canals, erect dams, open feeders, construct locks, and perform such other works, as they shall judge necessary or expedient, for completing the canal herein before mentioned and described; and out of the money arising from the subscriptions and tolls and other aids, hereinafter given, to pay for the same, and to repair and keep in order the said canals, locks, and other works, necessary thereto, and to defray all incidental charges; and also to appoint a treasurer, clerk, and other officers, toll-gatherers, managers, and servants, as they shall judge requisite; and to agree for and settle their respective wages or allowances, and to settle, pass, and sign their accounts; and also to make and establish rules of proceeding, and to transact all other business and concerns of the said company, in and during the intervals between the general meetings of the same; and they shall be allowed, as a compensation for their trouble therein, such sum of money, as shall, by a general meeting of the stockholders, be determined: *Provided, always,* That the treasurer shall give bond, in such penalty, and with such security, as the said president and directors, or a majority of them, shall direct, for the true and faithful discharge of the trust reposed in him, and that the allowance to be made him for his services shall not exceed three dollars in the hundred, for the disbursements by him made; and that no officer in the company shall have any vote in the settlement or passing of his own account.

SEC. 5. *And be it enacted,* That, on all subscriptions which shall not be paid, as hereinbefore provided, in certificates of the stock, or debts of the present Potomac Company, there shall be paid, at the time of subscription, on each share, one dollar; and thereafter, when the company shall be formed, the stock subscribed shall be paid on such instalments, and at such times, as the president and directors shall, from time to time, require, as the work advances: *Provided,* That not more than one third part shall be demanded within any year from the commencement of the work, nor any payment demanded within any year, from the commencement of the work, nor any payment demanded, until at least sixty days public notice thereof shall have been given, in such public newspapers as the said president and directors shall direct such notices to be published in; and whenever any subscriber shall fail to pay any instalment called for by the company, it shall and may be lawful for the company, upon motion, to be made in any court of record, after ten days notice, to obtain judgment against the subscriber so failing to pay; or, the said company, at their option, may, after giving sixty days notice in such public newspaper, printed within the District of Columbia, as they may judge proper, sell the stock of such subscriber; and if the proceeds of any such sale shall exceed the sum demanded, the surplus, after paying the expenses of such sale, shall be paid to the subscriber so failing, or to his legal representatives; and the purchaser at such sale, shall become a stockholder, and be subject to the same rules and regulations, and entitled to the same privileges, rights, and emoluments, as original subscribers under this act.

SEC. 6. And to continue the succession of the said president and directors, and to keep up the same number, *Be it enacted,* That, from time to time, upon the expiration of the same term for which the said president and directors were appointed, the stockholders of the said company, at the next general meeting, shall either continue the said president or directors, or any of them, or choose others in their stead; and, until such choice be made, the president and directors for the time being, shall continue in office; and, in case of the death, removal, resignation, or incapacity of the president, or any of the said directors, may and shall, in manner aforesaid, elect any other person or persons to be president and directors, in the room of him or them so dying, removing, or resigning; and may, at any of their general meetings, remove the president or any of the directors, and appoint others for and during the remainder of the term for which such person or persons were at first to have acted.

SEC. 7. *And be it enacted,* That every president and director, before he acts as such, shall take an oath or affirmation for the due execution of his office.

SEC. 8. *And be it enacted,* That the presence of stockholders, having a major part of the stock at least, shall be necessary to constitute a general meeting of the stockholders, which shall be held on the first Monday in June in every year, at such convenient town or place, as shall be, from time to time, appointed by the said general meeting;

but, if a sufficient number shall not attend on that day, the stockholders who do attend, may adjourn from time to time, until the stockholders holding the major part of the stock do attend, and the business of the company is finished; to which meeting the president and directors shall make report, and render distinct accounts of all their proceedings; and, on finding them fairly and justly stated, the stockholders then present, or a majority of them, shall give a certificate thereof, a duplicate of which shall be entered on the company's books; and at such yearly general meetings, after leaving in the hands of the treasurer such sums as the stockholders, or a majority of them, shall judge necessary for repairs and contingent charges, an equal dividend of all the nett profits arising from the tolls hereby granted, shall be ordered and made to and among all the stockholders of the said company, in proportion to their several shares, subject to the provisions and enactments hereinafter declared; and, upon any emergency in the internal between the said yearly meetings, the said president, or a majority of the said directors, may appoint a general meeting of the stockholders of the company, at any convenient town or place, giving at least one month's previous notice, in at least four of the newspapers in Pennsylvania, Maryland, Virginia, and the District of Columbia, which meeting may be adjourned and continued, as aforesaid. And, in case the stockholders, or a majority of them, in any general meeting aforesaid, shall deem it expedient to order a semi-annual rather than a yearly dividend as aforesaid, then, in like manner, with like notice, and under like restrictions, there shall be a half-yearly or semi-annual dividend of nett profits declared and paid.

SEC. 9. And be it enacted, That, for and in consideration of the expenses the said stockholders will be at, not only in cutting the said canal, erecting locks and dams, providing aqueducts, feeders, and other works; and in improving and keeping the same in repair, the said canal, and all other works aforesaid, or required to improve the navigation thereof, at any time hereafter, with all their profits, subject to the limitations herein provided, and to none other, shall be, and the same are hereby, vested in the said stockholders, their heirs and assigns, forever, as tenants in common, in proportion to their respective shares, and be forever exempt from the payment of any tax, imposition, or assessment, whatsoever; and that it shall and may be lawful for the said president and directors, at all times, forever, hereafter, to demand and receive, at such places as shall hereafter be appointed by the president and directors aforesaid, tolls for the passage of vessels, boats, rafts, produce, and all other articles, at such rates as the said president and directors may hereafter allow and establish, according to the provisions of this act.

SEC. 10. And be it enacted, That, if the commissioners hereby required to be appointed, shall die, resign, or refuse to act, the vacancy occasioned thereby shall be filled by the same authority by which the original appointment was made; and the person or persons appointed to fill such vacancy, shall have all the power and authority which was vested in the commissioner whose place he or they shall

be appointed to supply: and when any part of the canal aforesaid shall have been completed, according to the true intent and meaning of this act, the president and directors of the company hereby created, shall have power, and it shall be their duty, to ordain and establish a rate of tolls to be paid upon boats, vessels, rafts or other property, passing on the part of the canal so completed, and so, from time to time, as part or parts shall be completed, and until the eastern section thereof shall be finished up to the mouth of Savage river or creek, and thereafter until the entire canal shall have been finished, according to the true intent and meaning of this act; for the collection of which tolls, the president and directors shall have power to establish so many toll-houses, and at their pleasure to appoint and remove so many collectors, and at such places as, from time to time, they may judge expedient, and the said president and directors shall have full authority, subject to the direction and control of a majority in interest, of the stockholders represented in any general meeting, to regulate and fix a tariff of tolls, not exceeding an average of two cents per ton per mile, and so to adjust the said tolls, in relation to the capacity or burthen of the boats, and the dimensions of the rafts passing the locks of the said canal, as to promote economy of water and time in the navigation thereof.

SEC. 11. And be it enacted, That the president and directors shall annually, or semi-annually, declare and make such dividend of the nett profits from the tolls to be received, according to the provisions of this act, and from the other resources of the company, as they may deem advisable, after deducting therefrom the necessary current, and the probable contingent expenses, to be divided among the proprietors of the stock of the said company, in proportion to their respective shares, in manner following, that is to say: if such nett profits shall not exceed ten per cent on the amount of shares which shall have been paid for in current money of the United States, and expensed on the eastern section of the said canal, then the whole thereof shall be divided among the holders of such shares, in proportion to their respective shares; but if such nett profits shall exceed the rate of ten per cent. per annum, in any year, on such amount of stock, then the surplus shall be divided among such stockholders as shall have paid for their shares in certificates of the debts of the Patomac company, until they shall therefrom have received a dividend of six per cent, and if a surplus yet remain, the same shall be divided among the stockholders who shall have paid for their shares in certificates of the stock of the Potomac company, until they shall have received therefrom a dividend of six per cent per annum on such shares; and if a surplus still remain, so long as the western section of the canal shall remain unfinished, such surplus shall be applied, from time to time, to the construction and completion thereof, in such mode as the president and directors, under such rules and regulations, not inconsistent with the constitution of the United States, or of the several states aforesaid, as the stockholders or a majority thereof, in general meeting, may prescribe, until the western section of the canal shall be also completed;

after which, if such surplus shall still arise, the same shall be divided among all the stockholders, without discrimination, in proportion to their respective shares, until the annual dividend thereon shall have reached fifteen per cent. beyond which it shall never extend; but should the nett revenue of the company exceed that amount, for any two years in succession, then such excess shall be applied by the president and directors in such mode as shall be agreed on by a majority of the stockholders convened in general meeting; first, to strengthening and improving the works of the canal of every description: requiring the same next to the accommodation where not already provided, of the inhabitants of the shores of the river Potomac, and of the country drained by the tributary streams thereof, now navigable, or which may hereafter become so, by affording to them, in the best practicable mode, a safe and easy access to the canal, from the surface of the main river, and of the said streams emptying therein; and last of all, to the erection of such walls of stone, or other materials, along the water margin of the canal, as shall fit the same for the navigation of steam boats, of a size adapted to the said canal: and should the said tolls continue, after all such improvements have been completed, to nett more than fifteen per cent per annum to the stockholders, for any two years in succession, the tolls upon the same shall be reduced by the president and directors, according to some just and equitable ratio, till the said dividend shall fall to fifteen per cent per annum: *Provided*, That, should the said dividend thereafter sink below fifteen per cent. the said tolls, or a part thereof, may be renewed, till the said nett dividend reaches that amount; and for any, or all of the within mentioned purposes, the said president and directors are empowered to borrow, in behalf of the company, on the credit of such excess of tolls, such sum or sums of money, as they may deem expedient, at such rate of interest, and with such delay of payment, as they may stipulate, with the previous consent of a majority of the stockholders in general meeting convened.

SEC. 12. *And be it further enacted*, That it shall be the duty of the president and directors of the Chesapeake and Ohio Canal Company, so long as there shall be and remain any creditor of the Potomac Company, who shall not have vested his demand against the same in the stock of the Chesapeake and Ohio Canal Company, to pay such creditor or creditors, annually, such dividend or proportion of the nett amount of the revenues of the Potomac Company, on an average of the last five years preceding the organization of the said proposed company, as the demand of the said creditor or creditors at this time, may bear to the whole debt of one hundred and seventy-five thousand eight hundred dollars.

SEC. 13. *And be it further enacted*, That, whenever the Potomac Company shall have declared its assent to the provisions of this act, in the manner hereinbefore provided, it shall be lawful for the said company to surrender its charter, and convey, in due form of law, to the Chesapeake and Ohio Canal Company, hereby incorporated, all the property, rights, and privileges, by them owned, possessed, and enjoyed.

under the same; and, thereupon, it shall be lawful to, and for, the said company hereby proposed to be created, to accept such surrender and transfer, and to hold, possess, use and, occupy, all the said property, rights, and privileges, in the same manner, and to the same effect, as the said Potomac Company now hold, possess, and occupy the same by law; and, thereupon, the charter of the said Potomac Company shall be, and the same is hereby, vacated and annulled, and all the rights and powers thereby granted to the Potomac Company shall be vested in the company hereby incorporated; and it shall be the duty of the said last mentioned Company, until every section of the contemplated canal shall be completed, so as to be used and enjoyed for the purposes of navigation, to keep the corresponding part of the river in a proper state for navigation, and in good order, as the same now is; and in default thereof, they shall be, in all things responsible, in the same manner as the Potomac Company is now responsible; and in all rivulets, streams, creeks, and rivers, required for the western section of the said Chesapeake and Ohio Canal, the same rights shall be, and are hereby, vested in the Chesapeake and Ohio Canal Company by this act, as the charter of the Potomac Company, vested in the said company, in relation to the waters of the Potomac, and the tributary streams thereof.

SEC. 14. *And be it enacted,* That the said canal, and the works to be erected thereon, in virtue of this act, when completed, shall forever thereafter be esteemed and taken to be navigable as a public highway, free for the transportation of all goods, commodities, and produce, whatever, on payment of the tolls to be imposed, as provided by this act; and no other toll or tax whatever, for the use of the said canal and the works thereon erected, shall, at any time hereafter be, imposed, but by consent of the said states, and of the United States.

SEC. 15. *And whereas,* It is necessary, for the making of the said canal, locks, dams, ponds, feeders, and other works, that a provision should be made for condemning a quantity of land for this purpose, *Be it enacted,* That it shall and may be lawful for the said president and directors, or a majority of them, to agree with the owners of any land, through which the said canal is intended to pass, for the purchase, or use and occupation thereof; and, in case of disagreement, or in case the owner thereof shall be a female covert, under age, non compos, or out of the state or county, on application to a Justice of the Peace of the county in which such land shall be, the said Justice of the Peace shall issue his warrant, under his hand, to the sheriff of the county, to summon a jury of eighteen inhabitants of his county, not related to the parties, nor in any manner interested, to meet on the land to be valued, at a day to be expressed in the warrant, not less than ten, nor more than twenty days, thereafter; and the sheriff, upon receiving the said warrant, shall forthwith summon the said jury, and, when met, shall administer an oath or affirmation to every juryman who shall appear, being not less than twelve in number, that he will faithfully, justly, and impartially, value the land, and all damages the owner thereof shall sustain, by cutting the canal through such land, or the

partial or temporary appropriation, use, or occupation, of such land, according to the best of his skill and judgment, and that in such valuation he will not spare any person for favor or affection, nor any person grieve for malice, hatred, or ill will; and in every such valuation and assessment of damages, the jury shall be, and they are hereby instructed to consider, in determining and fixing the amount thereof, the actual benefit which will accrue to the owner from conducting the said canal through, or erecting any of the said works upon, his land, and to regulate their verdict thereby, except that no assessment shall require any such owner to pay, or contribute any thing to the said company where such benefit shall exceed, in the estimate of the jury, the value and damages ascertained as aforesaid; and the inquisition thereupon taken, shall be signed by the sheriff and some twelve or more of the jury, and returned by the sheriff to the clerk or prothonotary of his county, and unless good cause be shown against the said inquisition, it shall be affirmed by the court, and recorded: but if the said inquisition should be set aside, or if, from any cause no inquisition shall be returned to such court within a reasonable time, the said court may, at its discretion, as often as may be necessary, direct another inquisition to be taken, in the manner above prescribed, and upon every such valuation, the jury is hereby directed to describe and ascertain the bounds of the land by them valued, and the quantity and duration of the interest and estate in the same required by the said company for its use, and their valuation shall be conclusive on all persons, and shall be paid for by the said president and directors to the owner of the land, or his legal representatives, and on payment thereof, the said company shall be seized of such land as of an absolute estate in perpetuity, or with such less quantity and duration of interest or estate in the same, or subject to such partial or temporary appropriation, use, or occupation, as shall be required and described as aforesaid, as if conveyed by the owner of them; and whenever, in the construction of the said canal, or any of the works thereof, locks, dams, ponds, feeders, tunnels, aqueducts, culverts, bridges, or works of any other description whatsoever appurtenant thereto, it shall be necessary to use earth, timber, stone, or gravel, or any other material to be found on any of the lands adjacent, or near thereto; and the said president and directors, or their agent, cannot procure the same for the works aforesaid, by private contract of the proprietor or owner, or in case the owner should be a femme covert, or non compos, or under age, or out of the state or county, the same proceedings, in all respects, shall be had as in the case before mentioned, of the assessment and condemnation of the lands required for the said canal, or the works appurtenant thereto.

SEC. 16. *And be it enacted,* That it shall be the duty of the company hereby incorporated, to cut, make, and construct the said canal, with good and sufficient locks, on the most improved plan for expedition in the use thereof; and with a width of not less than forty feet at the surface of the water therein, or of twenty-eight at the bottom thereof unless the quality of the soil shall require a narrow base to admit of a sufficient slope to preserve the banks from

sliding down, and sufficient to admit, at all seasons, the navigation of boats and rafts, with a depth of four feet water at the least; and, whenever wastes shall be essential to the security of the said canal, and in no other situation whatever, along the same, the waste water of the said canal may be, from time to time, sold or disposed of by the said company, for the purpose of supplying such works and machinery, as require a water power. And along one side, at least, of the said canal, and such aqueducts as it may render necessary, there shall be provided, throughout its whole extent, a towing path of sufficient breadth to apply the power of horses to the navigation thereof.

SEC. 17. *And be it enacted.* That it shall and may be lawful for any of the said stockholders to transfer his or her shares, by deed, executed before two witnesses, and registered, after the proof of the execution thereof, in the company's books, and not otherwise, except by devise, which devise shall also be exhibited to the President and Directors, and registered in the company's books before the devisee or devisees shall be entitled to draw any part of the profits from the said tolls or dividends: *Provided,* That no transfer shall be made, except for one or more whole share or shares, and not for part of such share or shares, and that no share or shares shall, at any time, be sold, conveyed, or held in trust, for the use and benefit, or in the name of another, whereby the said President and Directors, or the stockholders of the said company, or any of them, shall or may be challenged, or made to answer concerning any such trust; but that every person, appearing as aforesaid, to be a stockholder, shall, as to the others of the said company, be, to every intent, taken absolutely as such; but, as between any trustee and the person for whose benefit any trust shall be created, the common remedy may be pursued.

SEC. 18. *And be it enacted,* That, if the said capital, and the other aids already granted by this act, shall prove insufficient, it shall and may be lawful for the said company, from time to time, to increase the said capital, by the addition of so many whole shares as shall be judged necessary by the said stockholders, or a majority of them present, at any general meeting of the said company; and the said President and Directors, or a majority of them, are hereby empowered and required, after giving at least two months previous notice thereof, in at least four of the newspapers printed in Virginia, Pennsylvania, Maryland, and the District of Columbia, to open books in the beforementioned states and district, for receiving and entering such additional subscriptions, in which the stockholders of the said company, for the time being, shall, and are hereby declared to have the preference of all others for the first thirty days after the said books shall be opened as aforesaid, of taking and subscribing for so many whole shares as any of them shall choose; and the said President and directors are hereby required to observe, in all other respects, the same rules therein, as are, by this act, prescribed for receiving and adjusting the first subscriptions, and, in like manner, to return, under the hands of any three or more of them, an exact list of such additional subscriptions, with the same subscribed, to the public authori-

ties as aforesaid, to be by them preserved as aforesaid; and all stock-holders of such additional shares shall, and are hereby declared to be, from thenceforward, incorporated into the said company.

SEC. 19. *And be it enacted*, That, whenever it shall become necessary to subject the lands of any individual to the purposes provided for in this act, and their consent cannot be obtained, it shall and may be lawful for the company to enter upon such lands, and proceed to the execution of such works, as may be requisite, and that the pendency of any proceedings in any suit in the nature of a writ of ad quod damnum, or any other proceedings, shall not hinder or delay the progress of the work; and it shall be the duty of every court to give precedence to controversies which may arise between the company created by this act, and the proprietors of land sought to be condemned for public uses, and to determine them in preference to all other causes.

SEC. 20. *And be it enacted*, That the said canal shall be, and the same is hereby divided into two sections, to be denominated first and second, or eastern and western, respectively; that the first or eastern section shall begin at the District of Columbia on tide water, and terminate at or near the bank of Savage river or creek, which empties into the north branch of the Potomac, at the base of the Allegany mountain; that the second or western section shall commence at the said termination, and extend along the valley of Savage river or creek, so far as the same, or any branch thereof, as may reach some convenient point thereon, for connecting the eastern and western waters, by a tunnel through, or an open cut across the dividing ridge between the same; and thence, after crossing the said dividing ridge, shall proceed to the highest steam-boat navigation of the Ohio river, or of some one tributary stream thereof, in such direction as, in the opinion of the said President and Directors, shall be best calculated for the attainment of the end set forth in the preamble of this act; that the said President and Directors shall first construct the eastern section aforesaid, out of the capital stock hereinbefore mentioned, and shall next proceed to construct, with all possible dispatch, the western section thereof. In case the said company shall not begin the said work within two years after the company shall have been formed, or if the work, having been so begun, shall not be diligently prosecuted, so that one hundred miles of the said canal, with the adequate locks and incidental improvements, shall not be completed and in fit order for navigation, in the term of five years from the commencement of the work, then all interest of the said company in the navigation and tolls, shall cease and determine, and their charter shall be thereafter taken to be null and void; and so, in like manner, shall the said charter be null and void, if the entire eastern section be not completed in the term of twelve years from the said commencement. And should the said company fail to begin the western section of the said canal in two years after the time allowed as aforesaid for the completion of the eastern section, or having begun the western section shall fail to complete the same in six years after such begin-

king, then, all right, title, and interest, of the said company in the said western section, shall cease and determine, and the several states aforesaid shall have full authority to incorporate another company, for the completion of such section, or to complete the same in any other mode that they may deem expedient. And if, after the completion of the said canal and locks, the President and Directors shall fail to keep the same in repair for twelve months at any time, then, in like manner, the interest of the company in the navigation and tolls shall cease, and their charter shall be forfeited.

SEC. 21. *And be it further enacted* That the right to the waters of the river Potomac, for the purpose of any lateral canal or canals, which the state of Virginia or Maryland may authorize to be made, in connexion with the said canal, is reserved to the said states respectively; that a similar right is reserved to the state of Pennsylvania in relation to the rivers and streams within the territory of that state, the waters of which may be used in supplying the western section of the said canal; that the Government of the United States shall retain the power to extend the said canal in or through the District of Columbia, on either or both sides of the river Potomac; *Provided*, that, before this act shall take effect, the Congress of the United States shall authorize the states of Virginia and Maryland, or either of them, to take and continue a canal from any point of the above named canal, or the termination thereof, through the territory of the District of Columbia, or any part thereof to the territory of the said states, or either of them, in any direction they may deem proper, upon the same terms and conditions, and with all the rights and privileges and powers of every kind whatsoever, that the company incorporated by this act have to make the Chesapeake and Ohio canal. *And provided also*, that, in taking or extending such lateral canal or canals through the District of Columbia, by either of the said states, no impediment or injury be done to the navigation of the said Chesapeake and Ohio canal.

SEC. 22. *And be it further enacted*, That this act, or so much thereof as respects the canal and works to be designed to be constructed in the District of Columbia and the states of Virginia and Maryland, shall take effect, with such necessary modification in the construction thereof as shall fit it for such limited application or use, upon the assent of the Congress of the United States, and the legislature of Maryland being given thereto, and upon its receiving the further assent of the legislature of Pennsylvania, the whole and every section and part thereof, shall be valid and in full force and operation.

SEC. 23. *Be it further enacted*, That the assent of the Congress of the United States, required by the first section of this act, and the authority conferred by the fourteenth section, is understood and taken to relate only to their authority as the legislature of the District of Columbia.

SEC. 24. *Be it further enacted*, That all acts and parts of acts coming within the purview of this act, shall be, and the same are hereby repealed.

Therefore, be it enacted, by the General Assembly of Maryland, That the said act of the General Assembly of Virginia, be, and the same is hereby accepted, assented to, and confirmed.

And be it further enacted and declared, That, by confirming and accepting the act of Virginia it is not intended by the Legislature of Maryland, to deny to the Congress of the United States, the constitutional power to legislate on subjects of Roads and Canals. And for the purpose of removing all doubt as to the right of the state of Maryland, to intersect the said Chesapeake and Ohio Canal, for the purpose of conducting a lateral canal or canals to Baltimore, or elsewhere in the state of Maryland, from that part of the said Chesapeake and Ohio Canal, which shall be within the District of Columbia—.

Be it further enacted and declared, That the said act of Virginia, has been accepted and confirmed by the Legislature of Maryland, on the express condition, that the act of Congress contemplated by the twenty-first section of the Virginia act, shall direct and provide some safe and practicable mode, whereby such lateral Canal or Canals, may be secured to the state of Maryland, and whereby also it may be determined whether such lateral canal or canals will injure the said Chesapeake and Ohio Canal, within the meaning and intention of the said twenty-first section of the Virginia act.

We hereby certify, that the foregoing is a true copy of the original act, as passed both branches of the Legislature at December Session, eighteen hundred and twenty-four.

WM. KILTY, *Clerk Sen. of Md..*

JOHN BREWER, *Clerk House Del.*

Annapolis, Jan. 31, 1825.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING A REPORT OF THE

EXAMINATION WHICH HAS BEEN MADE

BY THE

Board of Engineers,

WITH A VIEW TO

Internal Improvement, &c.

FEBRUARY 14, 1825.

Printed by order of the Senate of the United States.

WASHINGTON:

PRINTED BY GALE & SEATON.

1825.

To the Senate of the United States:

I herewith transmit a report from the Secretary of War, with a report to him by the Chief Engineer, of the examination which has been made by the Board of Engineers for Internal Improvement, in obedience to their instructions, of the country between the Potomac and Ohio Rivers; between the latter and Lake Erie: between the Allegheny and Schuylkill Rivers, the Delaware and the Rariton; between Buzzard's and Barnstable Bays and the Narragansett Roads and Boston Harbor, with explanatory observations on each route. From the views which I have taken of these reports, I contemplate results of incalculable advantage to our Union, because I see in them the most satisfactory proof that certain impediments, which had a tendency to embarrass the intercourse between some of its most important sections, may be removed without serious difficulty; and that facilities may be afforded, in other quarters, which will have the happiest effect. Of the right, in Congress, to promote these great results, by the appropriation of the public money, in harmony with the states to be affected by them, having already communicated my sentiments fully, and on mature consideration, I deem it unnecessary to enlarge at this time.

JAMES MONROE.

Washington, February 14, 1825.

WAR DEPARTMENT,

February 12, 1825.

SIR: I have the honor to present, herewith, a communication from the Chief Engineer, submitting to this department the proceedings of the Board of Engineers for Internal Improvement, under the act of Congress passed the 30th of April, 1824, authorizing the Executive to cause to be procured the necessary surveys, plans, and estimates, upon the subject of roads and canals. The reports are very full, and, in detail; the Board have reported favorably as to the practicability of passing the summit level between the waters of the Potomac and the Ohio, by means of a canal, and that it may be effected at a small expense, compared with the advantages expected to result from its execution, in a national and commercial point of view.

I have the honor to be,

Very respectfully, sir,

Your obedient servant,

J. C. CALHOUN.

To the PRESIDENT of the United States.

ENGINEER DEPARTMENT,

Washington, February 12, 1825.

SIR: I have the honor of laying before you the proceedings of the Board of Engineers for Internal Improvement, under your instructions of the 31st of May and 29th December, 1824, of which copies numbered 1 and 2 are enclosed, directing an examination to be made of a route for a canal communication between the tide waters of the Chesapeake and the Ohio rivers, and between the Ohio and Lake Erie; also, in relation to other examinations of routes for canals under other instructions. These proceedings are contained in the joint letter of the Board to this department, dated 2d of February, 1825, a copy of which, numbered 3, is enclosed; also, in the report of Gen. Bernard and Col. Totten, and in the separate report of Mr. Sullivan, of the former of which marked A, and the latter marked C, copies are transmitted herewith.

I have the honor to be,

Very respectfully, sir,

Your obedient servant,

ALEX. MACOMB,

Maj. Gen. Chief Eng.

Hon. J. C. CALHOUN,
Secretary of War.

No. 1.

ENGINEER DEPARTMENT,

Washington, May 31, 1824.

GENTLEMEN: I am directed, by the Secretary of War to inform you, that the President has, under the authority of the act of Congress, dated the thirtieth of April, 1824, appropriating \$ 30,000 for the purpose of procuring the necessary surveys, plans, and estimates, upon the subject of roads and canals, appointed you as a Board of Internal Improvement, to superintend the execution of the provisions of the said act. There will be attached to the Board for the present, Major Abertt of the Topographical Engineers, with five assistant lieutenants; Capt. M'Niell, of the same corps, with an equal number; and Mr. Shriver, who is well acquainted with the localities of the country, and who is authorized to employ, under your directions, five citizen surveyors. Captain Poussin, of the Topographical Engineers, and Lieutenants Courtenay and Dutton, of the corps of Engineers, will be immediately attached to the Board in its operations. The officers detailed for service and the citizens employed, will report to the Board for orders. The rules and regulations established in the prosecution of the survey of the coast, will apply in the disbursement of the appropriation, and the compensation to be allowed the officers of the army, who may be detailed for service under the act. The Board will observe the same rules in reporting, from time to time, the progress made in the execution of the duties assigned to them.

The Board will proceed to make an immediate reconnaissance of the country between the tide waters of the river Potomac, and the head of steam boat navigation of the Ohio, and between the Ohio and Lake Erie, for the purpose of ascertaining the practicability of a communication between those points, of designating the most suitable route for the same, and of forming plans and estimates in detail, of the expense of execution.

It is very desirable that the report should be received on this important line of communication, in time to be submitted to Congress at their next session. The Board will accordingly use every possible exertion to effect that object.

I have, &c.

ALEX. MACOMB,

*Maj. Gen. Chief Engineer.*To General BERNARD, *Assistant Engineer,*Lieut. Col. TOTTEN, *of the corps of Engineers,*JOHN L. SULLIVAN, Esq. *Civil Engineer.*

No. 2.

ENGINEER DEPARTMENT,

Washington, Dec. 29, 1824.

GENTLEMEN: The Board of Internal Improvement will forthwith prepare a Report of their proceedings, under instructions communicated by order of the Secretary of War, by this Department, dated the 31st of May last, and subsequently, in relation to Internal Improvements. The Board will state their opinion as to the practicability of the several routes for canals which they have examined, should the examinations have been sufficient to justify the Board in forming their opinion; but, where the Board have not been able to decide definitively on any particular route, they will express their impressions of the importance of that route, or any other property or advantage which such route may have presented to the view of the Board, or other observations which the Board may deem proper to make in relation thereto. When the Board shall decide favorably in regard to any of the routes, they will, in like manner, express their opinion fully, with such observations, on the advantages and benefits which may be expected to arise from the construction of the canal.

The Board will also report the operations of the Topographical Engineers and Surveyors, connected with the examinations of the Board, as far as the state of their work will permit.

The Secretary of War is desirous of receiving your report as early as practicable, in order to lay it before the present Congress.

I have, &c.

ALEX. MACOMB,

Maj. Gen. Chief Engineer.

To Brig. Gen. S. BERNARD,

Lt. Col. J. G. TOTTEN,

J. L. SULLIVAN, Esq.

Board of Internal Improvement, Georgetown, D. C.

No. 3.

WASHINGTON CITY, Feb. 3d, 1825.

SIR: The Board of Internal Improvement have the honor to transmit two reports on the proposed canal communication between the tide water of the Potomac and the Ohio river—between the Ohio and Lake Erie; between the Allegany and Schuylkill, or tide water of the Susquehanna; between the Delaware and the Rariton; between Buzzard's and Barnstable Bays, and between Narragansett Roads and Boston Harbor. Accompanying these reports, will be found a letter from Dr. Howard, on his reconnoissance of the country south of the Glades; a memoir on part of the Allegany river; a memoir by each of the chiefs of brigade, viz. Major Abert, Captain McNeill, and Mr. James Shriver; a letter from Lieut. John N. Dillahunty;

copy of the records of the Board in relation to the Ohio and Lake Erie canal routes, and nineteen maps, general and particular, of the several sections of country explored and surveyed, of which the following is a list.

- No. 1. Survey of part of the route of the Potomac canal, in 1824, by J. J. Abert, Major and T. E. assisted by Lieuts. Swift, Macomb, Bennett, Long, and Wilson.
- No. 2. Maps of the eastern section of the summit level of the Chesapeake and Ohio canal, surveyed by Wm. Gibbs McNeill, Capt. U. S. Topographical Engineers, Lieuts. Lewis G. De Russy, Wm. Cook, Isaac Trimble, R. C. Hazzard, John N. Dillahunt, John M. Fessenden, W. G. Williams.
- No. 3. Profiles attached to Capt. McNeill's map of the summit level; numbered 2.
- No. 4. Profiles attached to Capt. McNeill's map of the summit level; numbered 2.
- No. 5. Profiles attached to Capt. McNeill's map of the summit level; numbered 2.
- No. 6. Profiles attached to Capt. McNeill's map of the summit level; numbered 2;
- No. 7. Profiles attached to Capt. McNeill's map of the summit level; numbered 2.
- No. 8. Profiles attached to Capt. McNeill's map of the summit level; numbered 2.
- No. 9. Plan of a proposed summit level of the Ohio and Chesapeake canal, between the Little Youghiogany and Crabtree creek, by Mr. Howard, assistant Civil Engineer.
- No. 10. Profile of the surface of the ground over a proposed summit level of the Ohio and Chesapeake Canal, by Mr. Howard, assistant Civil Engineer.
- No. 11. Map of surveys of the western section of the summit level of the Chesapeake and Ohio canal, by James Shriver, assistant Civil Engineer.
- No. 12. Topography of the map of surveys, by James Shriver, assistant Civil Engineer.
- No. 13. Profiles attached to Mr. James Shriver's map, numbered 11.
- No. 14. Profiles attached to Mr. James Shriver's map, numbered 11.
- No. 15. Profiles attached to Mr. James Shriver's map, numbered 11.
- No. 16. Map of the country between Washington and Pittsburg, shewing the proposed routes of the Chesapeake and Ohio Canal, compiled by E. H. Courtenay, Lieut. corps Engineers.
- No. 17. Map of the country between Pittsburg and Lake Erie, shewing the proposed routes of the Ohio and Erie canal, compiled by Mr. Howard, assistant Civil Engineer.
- No. 18. Map of the country between Pittsburg and Philadelphia, shewing the route of a proposed canal from the Ohio to the Delaware, compiled by George Dutton, Lieut. corps of Engineers.

No. 19. Plan and profile of a survey and level for the proposed canal between Buzzard's and Barnstable Bay, surveyed September, 1818, by L. Baldwin—copied by Lieut. Fessenden, of the Artillery.

In execution of the orders of the Secretary of War, communicated in your letter of the 31st May last, "to make a reconnoisance of the country between the waters of the Potomac and the head of steam boat navigation of the Ohio, and between the Ohio and Lake Erie, for the purpose of ascertaining the practicability of a communication between these points; of designating the most suitable route for the same; and of forming plans and estimates, in detail, of the expense of execution;" the Board proceeded from the seat of government, through the portion of country indicated therein. Having deliberately examined every local circumstance on that part of the Allegany mountain which lies between the head waters of the Potomac and those of the Youghiogheny, a branch of the Monongahela, the Board prepared instructions for the preliminary surveys and measurements to be executed by the Topographical Engineers and other officers and gentlemen attached for this service; and having now maturely considered the circumstances observed by them personally, and carefully studied the results of such of these preliminary surveys as are completed, *they are decidedly of opinion that the communication is practicable.*

The Board, on viewing the country between the Ohio and Lake Erie, along various lines indicated by public opinion, became possessed of such facts as place the practicability of canalling, from the head of steam boat navigation, in the Ohio, to Lake Erie, beyond all doubt. The information collected by the Board is not, however, of a nature to enable them to decide which of the several routes deserves a preference; and a definitive choice can only be made after the several surveys, indicated by the extract from the record of the Board, herewith, shall have been executed.

In further execution of orders, the Board repaired to the state of Massachusetts, and viewed the ground between Buzzard's and Barnstable Bays, where the isthmus of Cape Cod is not only narrow, but so low, compared with the adjacent country, as to have attracted public attention to this improvement, at an early period. Aided by the maps and reports heretofore made of this ground, at the public expense, and by maps and investigations which had been made more recently, at private expense, the Board are of opinion that this canal might be opened, at least as deep as low water, at no extraordinary cost. The tide rising from eight to ten feet on the Barnstable side, this depth of water might be carried through the canal. The locks, on the Barnstable side, to be protected by a breakwater, or pier.

The board also made a reconnoissance of the ground between Narragansett bay, and Boston harbor; likewise, with the advantage of knowing the result of previous surveys, under the authority of the

state government, whence they infer that further investigation may show this communication to be practicable.

In execution of the orders of the Secretary of War, requiring a co-operation with the canal commissioners of the state of Pennsylvania, the board examined the whole route of the proposed canal, from the Allegany to the Schuylkill. From observations made by the board along this line, and from surveys, and levellings, since made by the Pennsylvania commissioners, the board are inclined to believe in the possibility of this work; but they think that further investigations are necessary to the definitive settlement of this question.

The co-operation of the board, with the commissioners of the state of New Jersey, resulted in a strong conviction of the practicability of a canal communication between the Delaware, and the Rariton, by leading the water of the former, from about twenty-six miles above the city of Trenton, to the summit ground between Trenton and Brunswick; and that the abundance of the water of the Delaware will supply a canal, of dimensions adapted to the vessels navigating the great rivers and bays of the seacoast. The board are, however, of opinion, that, previous to fixing the exact route of the canal, lines should be run from the vicinity of Bordentown, across the summit, to the lowest point on the Rariton, to which a canal can, with due economy, be extended, with a view to avoid as much of the difficult tide navigation of the two rivers as possible.

The board has the satisfaction to acknowledge the zeal, perseverance, and ability, with which all the officers of the two corps of engineers, and other gentlemen attached to the service, have fulfilled their duties, to the extent which the time, and the season of the year permitted. The unfinished parts of their instructions comprehend the eastern section of the Ohio, and Chesapeake canal, from Cumberland to tide, some lines on the summit, and the whole western section.

We have the honor to be,

Very respectfully,

Your obedient servants,

J. G. TOTTEN, *Maj. Eng. Bl. Lt. Col.*

S. BERNARD, *Brig. Gen.*

JNO. L. SULLIVAN.

Members of the Board of Internal Improvement.

To Bt. Maj. Gen. ALEX. MACOMB,

Cot. Com. U. S. Engineers.

A:

REPORT

Of General S. Bernard, and Lieut. Col. J. G. Totten, members of the Board of Internal Improvement, on the several Canal routes examined in 1824, by orders from the War Department.

The routes for Canals which have been successively examined during the late season, by orders from the War Department, are as follows:

1st. One to unite the Chesapeake and Ohio, through the Valley of the Potomac, on the eastern, and that of the Youghiogany on the western side of the Alleghany Mountain.

2d. One to unite the Ohio with Lake Erie, through the Valley of Big Beaver Creek, on the southern side, and several directions across the country which slopes to the Lake, on the northern.

3d. One to unite the Ohio and Schuylkill, through the Valleys of the Alleghany river, Kiskimintay, great and little Conemaugh rivers, on the western side, and Juniatta and Susquehannah, on the eastern, to a point below Harrisburgh, and from thence to Philadelphia, through Lancaster county.

4th. One to unite the Delaware and Raritan, through the Valleys of Crosswick Creek, and across the Assunpink, on the western side, and the Valley of Lawrence's Brook, on the eastern.

5th. One through the isthmus of Cape Cod, from Hyannis harbor to Barnstable harbor.

6th. One to unite Buzzard's Bay and Barnstable Bay, by Monument river, and Scussett river.

7th. One to unite Narragansett Bay and Boston harbor, from Taunton river to Weymouth landing.

This report will comprise the successive examination of each of these routes; but, in the first place, it will be proper to indicate the series of operations which the Board have adopted to arrive at a definitive result, in the formation of the system intrusted to them.

The complete *project* of a canal requires great researches, and a careful investigation of its smallest details. The first operation must be to reconnoitre the ground at sight, and thus investigate, in a general manner, the main features of its hydrography and topography; this can only give general results, and approximated conjectures, more or less exact; accurate surveys must afterwards ascertain the positive facts, disengaged from all speculative ideas. Thus, 1. To reconnoitre the ground. 2. To survey accurately its topographical

features, and measure its water-courses, to ascertain their sufficiency to feed the projected canals; such are the preliminary operations which must precede the more minute details of the *project*.

The general facts established by these preparatory operations, enable to indicate approximatively the route which the canal must follow. Then, we must trace its directing line on the ground itself, and, with the level in hand, bend it to every local circumstance. The route of its feeders, the capacity of its *reservoirs*, the location of its locks, and the system to adopt in varying their lifts; the location of its dams, tunnels, and culverts, must be determined at the same time; the nature of the soil must be ascertained, and the feeding water-courses accurately gauged, when they are at the highest, and when they are at the lowest stage. This second series of operations determine the final location of the line of canal, and ascertains the several works, in earth, timber and masonry, which will be required; as well as the quantity and distribution of the waters, which the localities afford to feed the different levels, in an equal and sufficient manner.

These being ascertained, the only remaining operations are, to draw these several works, of earth, timber, and masonry; calculate their dimensions; fix their construction, and the nature and manner of employing the materials required for this purpose; and, lastly, to estimate exactly their cost, and draw up the detailed statement of it.

By following the successive series of operations which we have just analyzed, nothing is left to conjecture; every part of the work is studied and ascertained and no chance is left for mistakes of facts, or miscalculations, to endanger the success of its completion. This regular mode of proceeding is the surest way to avoid those illusive deceptions, from whence such works have so frequently failed. The general project corresponds in its results with the details; the whole combines economy, solidity and durability, and the estimates being founded upon positive and ascertained facts, their accuracy may be depended upon.

Upon these principles the Board have divided the task which was confided to them, in the following manner.

1st. Reconnoitering and making the preparatory survey of each project.

2d. Tracing it in detail on the ground.

3d. Drawing the works, and ascertaining their estimate.

Passing to the successive examination of the several routes for canals mentioned above, we will begin by that which is destined to unite the Chesapeake and Ohio.

CHESAPEAKE AND OHIO CANAL.

This canal may be divided in three sections, eastern, middle, and western. The eastern section extends from the tide-water in the Po-

tomac, to the mouth of Savage river, in the northern branch of the Potomac. The middle section extends from the mouth of Savage river, in the Potomac, to that of Bear creek, in the Youghiogany. The western section, from the mouth of Bear creek to the Ohio, at Pittsburg.—(See maps and profiles, from No. 1 to No. 16.)

EASTERN SECTION.

This section ascends the valley of the Potomac; as the several ridges which that river traverses and breaks through, oblige to follow its course, without any deviation, the side on which it should ascend along the river, is the only choice left to the Engineer; we will, therefore, compare the respective facilities for receiving the bed of a canal, which exists on each of those sides.

From Georgetown to the Little Falls bridge, the northern shore of the river is flat, whilst, on the southern shore, the mountain extends closer to the stream, and is more abrupt.

From the Little Falls to the Monocacy, the northern shore is very rugged, but from the Monocacy to Harper's Ferry, it offers a succession of flats and bluffs. The southern shore on that whole extent, is very rugged; its banks of red slate hang perpendicularly over the stream in several places.

From Harper's Ferry to Shepherdstown, both shores present undulating flats, and a soil easy to work. The same nature of ground runs from Shepherdstown to Williamsport.

From Williamsport to Hancock, the northern shore presents extensive flats, whilst the mountain on the southern shore stretches closer to the bed of the river.

From Hancock to Town creek, the northern shore is flat, to the promontory formed by Sidelong hill, and from thence presents a succession of flats to Town creek. The southern shore offers no greater facilities, except in front of Sidelong hill.

From Town creek to Old Town, the flats on the northern shore are only interrupted by a precipitous bluff, on an extent of about 600 yards. The southern shore presents no advantages over it.

From Old Town to Cumberland, the northern shore is flat, except for one mile along Alumrock, and the same extent along Braddock's hill.

From Cumberland to the mouth of Savage river, the valley grows narrower, its flanks close on the bed of the river, and the northern shore is little better than the other.

This short analysis is sufficient to show, that the northern side of the valley offers the best ground for receiving the bed of a canal. Some portions of the southern bank might be more favorable than the portions of the northern shore which face them; but, in order to render this advantage available, it would be necessary to cross the river frequently by aqueducts, which would cost more than the expense required to subdue the obstacles of the northern shore. Another important consideration, which should determine our prefer-

ence of it, is its exposition to the south, by means of which, the canal will be earlier and longer navigable, and less subject to be seized by sudden frosts in spring and autumn. To extend the advantages of the canal to the inhabitants of the southern shore of the Potomac, it will be proper, in the project, to trace the works required, in order to unite with the canal the tributary streams which join it on that side. Those streams might thus contribute to feed the canal, and extend the benefits of its communication.

From the mouth of Savage river to Georgetown, the Potomac breaks through the several ridges which run parallel to the Alleghanies, and receives the tributary streams which run between them, from the north and from the south. Wherever the river breaks through these ridges, its navigation is interrupted, by falls or rapids.

The art of the engineer must avail itself of these falls, by erecting dams at those places, to raise the waters and form reservoirs, that may feed the canal. That same art must, also, make the tributary streams of that river, contribute to the same purpose, and convey into the canal the surplus of their waters, and the produce of their valleys.

In proceeding from west to east, the principal ridges, which are thus broken through by the Potomac, are, Will's mountain, Evit's mountain, Rugged mountain, Sidelong hill, North mountain, South mountain, and Cotoctin mountain. The shores are most rugged and precipitous, at the spots where the river breaks through them; the intermediate parts answer to the valleys, which run between these ridges—they are generally flat, and offer a soft and rich soil, perfectly adapted to the purposes of a canal.

The main falls of the Potomac are at Harper's ferry, where it breaks through Elk and South mountains, at the rupture of Rugged Mountain; at that of Sidelong hill, the falls of Green spring at the rupture of North mountain; the Hook falls, at the rupture of Cotoctin mountain; the Seneca falls, Great falls, and Little falls. Besides these, it presents, above Harper's ferry, several rapids, whose fall is less considerable, and does not deserve a particular notice with respect to our subject.

The tributaries, from the northern bank of the Potomac, whose waters might feed the canal, are from west to east: Savage river, George's creek, Conococheague, Antietam creek, Cotoctin creek, and the Monocacy river.

The tributaries, from its southern bank, are, the South branch, Great and Little Cacapon, and Shenandoah. The waters of the Potomac do not rise at fixed periods; they generally, however, attain their greatest elevation in the months of March and April, whilst, from June to September, they are at their lowest stage. In the dryest seasons, the higher parts of its bed, do not present above 18 inches in depth, as in all other rivers, the middle parts of its course rise more than the upper or lower parts. At Cumberland, it rises about 12 feet; at Hancock, 25 feet; at Williamsport, 50 feet. From thence,

to the Little falls, the waters rise less and less. It generally freezes in January and February.

From the surveys of Messrs. Moore & Briggs, the distances from Cumberland to the bridge of the Little Falls, have been found as follows:

From the mouth of Savage river to Cumberland, (Major Abert's survey.)	- - -	$27\frac{1}{2}$ miles.
From Cumberland to the Great Cacapon,	-	$54\frac{1}{2}$
From the Great Cacapon to Conococheague,	-	$33\frac{1}{2}$
From Conococheague to Harper's Ferry,	-	$38\frac{3}{4}$
From Harper's Ferry to the Great Falls,	-	$46\frac{1}{4}$
From the Great Falls to tide-water	- -	9
		<hr/>
		$209\frac{1}{2}$ miles.

The general descent of its bed is, nearly, as follows:

From the mouth of Savage river to Cumberland, (Major Abert's Survey.)	- - -	$327\frac{1}{2}$ feet
From Cumberland to tide water,	- -	<hr/>
		$864\frac{1}{2}$ feet.

Such are the local features of the valley, through which this section of the canal, east of the Alleghany, must be directed. We will now proceed to those preparatory operations, which were necessary to determine the route through which this section must pass.

The execution of these operations and preparatory surveys, were confided to the talents of Major Abert, of the Topographical Engineers of the United States' Army. He was assisted by the Lieuts. of Artillery, Swift, Macomb, Bennet, Long, and Wilson. The Board having left Washington in the beginning of June, the necessary instructions could not be sent to Major Abert till the 30th of that month, when they had examined the ground. That officer was, meanwhile, making the necessary preparations for rendering himself, with his assistants, on the spot; and, in the first days of July, began the operations entrusted to him. But in the middle of August he was obliged to suspend them: the country had become unhealthy, and his officers were all taken sick. The result of these operations, as far as he could bring them to a conclusion, in the short time whilst he could remain on the ground, is joined to this report; and, what he performed in that time proves, that, in beginning his labors early next spring, he will be enabled to complete, during the next season, the preparatory surveys of that section of the canal.

These surveys will determine the data which must guide us in adapting its line exactly to the ground, and fix the precise position of its several works. As to the practicability of this section, there can exist no doubt. The ground offers no difficulties which may not be overcome, at a moderate expense. The tributary streams of the Potomac provide supplies beyond what the consumption of the canal re-

quires; and the Potomac itself, by erecting dams across the summits of its rapids, will afford additional aid for this purpose. In indicating the probable general route of this section, we shall report the operations and surveys made, and those which remain to be performed, before its line can be fixed in a final and definitive manner.

These preparatory surveys have given the following results, as to the portion of the canal between the mouth of Savage River and Cumberland.

From the mouth of Savage River, in descending the Potomac, its northern shore presents a perpendicular bank of a compact mass of sandstone: the canal must therefore run for half a mile along the southern shore, when stopped by a perpendicular bluff of knobly mountain it crosses over and follows the northern shore for one mile. Here another perpendicular mass of rocks compels it to pass to the southern side, from whence it crosses over to the northern, at Westernport, at the mouth of George's Creek. From the mouth of Savage River to that of George's Creek, the canal must therefore cross the Potomac four times, in a space of two miles, unless the expense of running it along those obstacles, on an embankment supported by dry walls, should prove less than that of constructing four aqueducts.

From Westernport to W. R. Dawson's, on a space of eight miles, the canal follows the northern shore of the valley. This portion will require several deep cuts, and it will be frequently necessary to cut a shelf in the flank of the mountain, to run the canal upon.

From W. R. Dawson's to S. Cresap's, the distance is four and a half miles: A little below Dawson's, Fort Hill, a high and rocky mountain, fills up the northern shore, and compels us to run the canal across the river: and as in two other places, that hill closes the passage, we must cross the Potomac twice, between Dawson's and Cresap's, unless it be found less expensive to continue the canal on an embankment round these obstacles. It was endeavored to turn round the north of Fort Hill, along the road from Dawson's to Tenyard, but the ground was found too high, its summit being elevated $342\frac{1}{2}$ feet above Dawson's.

From Cresap's to Armstrong's, the canal follows the northern shore, through a rich, alluvial, and very favorable soil. From Armstrong's, to a point four and a half miles below it, we should cross the Potomac four times, to keep in the most favorable ground. But the expense of those aqueducts must be compared with that of the deep cuttings and wallings which would be required to avoid them.

From Tenence to Lynn the canal follows the northern shore, on a distance of three and three quarter miles. It meets with only two obstacles: a spur of slaty rock, and a mass of calcareous stone, which hang perpendicularly, but for a short space over the river, otherwise the ground is favorable.

From Lynn the canal may turn round the north of the hill on which Fort Cumberland is built, and cross Wills Creek above the bridge, or turn round its south along the Potomac and Wills Creek,

to cross at the same place, or below the bridge; the distance by the first route would be half a mile.

Such is the general direction of that section, from Savage River to Cumberland. Its length is from 27 to 28 miles, and its fall 327 $\frac{1}{2}$ feet. To keep on the best ground in the valley, it should cross the Potomac 12 times; but in drawing up the final project, it will be necessary to compare the expense of those aqueducts, with that which will be required to overcome the obstacles which compel to cross so often. We have every reason to believe, that a much less number of aqueducts will then be thought sufficient.

The labors of the brigade, charged to execute the surveys of the eastern section, having been suspended by sickness, as stated above, they did not proceed any further. The waters from Savage River to Cumberland have not been gauged; the extent of the reservoirs, their location, and the profile of their dams, have not been fixed. As to the location of the locks, it can only be determined upon, when all the preparatory surveys of the canal are concluded, and a general system adopted to connect them together.

The valley of the Potomac, above Cumberland, is well timbered, and fine grained and compact sandstone abounds all through it. Clay is abundant, but the highest point, where limestone is found, is one and a half miles below Westernport. Excellent building stone, a great variety of sandstone, and coal, are found in every part of the mountains, which bound the head of the valley.

In descending from Cumberland, the Canal will cross Evet's creek, and as this stream gives a constant supply, a feeder may bring its waters to it, and the minimum quantity which it may furnish, must be accurately gauged.

From thence to Braddock's hill, it will follow the left shore; but if it ran farther on that side, shelves should be cut through Braddock's hill, Alum hill, and Old Town bluff, or it should turn round them on embankments, supported by walls. At this point, the two shores should be surveyed with care, to fix the best line on which the Canal should be run. 1st. It might run, as just mentioned, in front of those three bluffs. 2d. It might turn round the north of Alum hill, and the front of the two others. 3d. It might cross the Potomac above Braddock's hill, follow the right shore, and cross over below Old Town bluff, and above South branch cape. 4th. The Potomac, from Braddock's hill, to the ledges below the South branch, might, by a dam run across those ledges, be formed into a basin, serving as a haven for the boats descending the South branch, feeding the lower parts of the Canal, and forming a part of it. Thus, the expense of the aqueducts, and of four or five miles of Canal digging, might be avoided; the post track in this case, would remain on the left shore. Surveys and levels, by giving positive data can alone determine which is the best of these courses. Whichever is adopted, the waters of the South branch must be brought to the Canal, and the feeder connecting them be made navigable. In the first or second hypothesis, the feeder should cross the Potomac above or below the mouth of South branch;

in the third, it should fall in the Canal above the mouth of that river, as it would perhaps be shorter; in the fourth, it should enter the Potomac to the west or east of South branch cape, above the dam, or a dam and lock might be erected at the mouth of the South branch itself.

From Town creek to Sidelong hill creek, the narrow strip which runs along the left shore, offers the best ground for the Canal, which must cross Town creek and 15 mile creek, on aqueducts. As the former offers a constant supply, it should be guaged, and a feeder run to lead its water into the Canal. If Sidelong creek afford the same advantage, it should be used in the same manner. The long and perpendicular bluff of Sidelong hill compels to cross the Potomac above the mouth of this creek, and follow the right shore till you reach opposite Conoloway creek. Here the Canal may pass to the left. Indeed, from the South branch to this spot, and even to Harper's Ferry, it will be proper to examine the right shore, and ascertain whether it is not preferable to the other. Supposing the proposed directions adopted, the Canal will require three aqueducts, two over the Potomac, and one over the Great Cacapon. This river and the Conolaway may supply the Canal with their waters, and of course must be guaged, and feeders led from them.

From the Conolaway to the Coneocoheague, at Williamsport, the Canal may follow the left shore, crossing the Coneocoheague on an aqueduct: that stream should be guaged, and a feeder led from it. From thence to the foot of Elk mountain, in front of Harper's ferry and the Shenandoah, it continues on the same side, crossing Hatictian creek. Here we may, 1st, either lead the Canal round the front of the bluff, on a shelf or embankment, or 2d, run a dam across the ledges, half a mile below Harper's ferry, forming a basin for the boats descending the Shenandoah, and a reservoir to supply the lower parts of the Canal—the upper part descending by locks, from Elk mountain, into it. In the first hypothesis, the waters of the Shenandoah should supply the Canal. It should be guaged, and a feeder, crossing the Potomac on an aqueduct, led to it; that feeder should be navigable, to favor the passage of the Shenandoah boats into the Canal.

From Elk mountain to the Monocacy, the left shore offers the best ground, though it presents two formidable obstacles—South and Cotoctin mountains. The Canal must be led along their fronts, on shelves or embankments, and dams must be erected at the South mountain falls, and Cotoctin mountain falls, or Hook's falls, where the river breaks through the ridges. They will form reservoirs for the lower portions of the Canal. It will cross the Monocacy on an aqueduct. That river must be guaged, and a feeder led from it. Griffin's falls offer a favorable position for a reservoir, by throwing a dam across them.

From the Monocacy to the Great falls, the Canal must follow the stony and perpendicular bank which leaves a narrow strip of flats on the left shore; shelves cut in the rock, and embankments will be frequently required, especially 'twixt the Seneca and Great falls. The

level of this portion of the Canal must be kept as high as possible, in order to run it above, and to the north of the rugged banks which lie between these falls. A dam across the great falls might form a reservoir for the lower portions of the Canal: a wing dam may also be required at Seneca falls. It is desirable that the works at Great falls should not interfere with the canal which at present turns them on the right shore, as it may be useful for floating rafts and timber, when the navigation of the Potomac will be improved.

The Canal then continues along the left shore, winding round the bank which extends from the Great to the Little falls, and from thence, along the flats of the same shore, to the head of tide water in the Potomac. If, however, it be found possible to open a direct communication from Seneca falls to Washington, the obstacles which lie between the Great and Little falls, may perhaps be avoided. To ascertain this fact, a level should be run between the Seneca falls and the Rock creek which divides Georgetown from Washington. A ravine, running to the north of the Great falls, seems favorable to this line. It should be surveyed with care, and a level run on the north ridge of the height which runs from the Great falls to Washington, and on the eastern point of which is built the town of Georgetown.

MIDDLE SECTION.

This section, from the mouth of Savage river, in the north branch of the Potomac, extends to the mouth of Bear creek, in the Youghiogheny, on the west side of the Alleganies. It includes the summit level of the canal, and from the complicated topography of the ground, the height which must be overcome in a short space, and the difficulty of securing a sufficient supply of water, in dry seasons, at such an elevation, presents the greatest difficulties which occur in the whole project.

The little Back Bone Ridge divides the waters, which, in that part of the Alleganies, runs east and west; it runs parallel to the great Back Bone, through which Savage river forces its way, and the canal must, absolutely, pass through this gap. Between those two ridges run Crabtree creek, from S. W. to N. E. and Savage river from N. W. to S. E.; the former falling into Savage river four and a half miles above its mouth in the Potomac. From the west side of the little Back Bone fall Deep creek, and the little Youghiogheny, the latter runs from E. to W. and, after forcing its way successively through Hoop-Pole ridge, and Roman Nose ridge, joins the great Youghiogheny. Deep creek runs at first to the north, crossing Hoop-pole ridge, and Negro mountain; then, intercepted by Marsh mountain, it turns west, and falls into the Youghiogheny. The gap through which it forces its way across the Hoop-Pole ridge, is only sixty six yards wide, and is called the Narrows.

The heads of the little and great Youghiogheny, to some miles above the point where they join in a single stream, run through marshy meadows, known by the name of Glades. The valleys of Deep creek,

and its tributaries, offer the same features as low down as Marsh mountain, from whence their course continues in a deep and narrow ravine, with steep, and rugged banks. The bottom of these glades, which has been sounded in several places, present the following layers: 1st. Rich loam. 2nd. Sand, colored by oxydated iron. 3d. Vegetable detritics. 4th. Alluvial clay. 5th. A horizontal bank of sand stone, four or five feet below the surface, on which the other layers all lie.

The great Youghiogheny, after receiving the little Youghiogheny, and Deep creek, receives Bear creek. The east branch of this last stream rises on the west side of Negro mountain, and runs from south to north till it forces its way through Keyser's ridge; it then turns suddenly east, and, after forcing through Winding ridge, falls into the Youghiogheny. Its west branch springs from the west side of Keyser's ridge, and joins the other at the gap where it forces its way through Winding ridge.

Savage river runs on a bed of sand stone, its course is rapid, and broad flats extend along both its banks. Crabtree creek is the chief tributary stream which joins it; it runs between the great and little Back Bone, and is formed by the junction of Crabby's arm, and Wilson's fork, which take their sources in that part of the little Back Bone which divides their ravines from the valley of the little Youghiogheny. Crabby's arm runs in a narrow vale, but which is, however, wide enough to receive a canal; its bottom is a black alluvial soil, and its banks present a gentle slope. Wilson's fork is more rapid, but runs in a wide and well wooded valley. These two streams join at Swan's mill, from whence they impetuously descend on a bed from ten to twenty yards wide; they are interrupted in two or three places by perpendicular falls, seven or eight feet high, and frequently by smaller rapids, which fall from four to five feet. From the great Back Bone, Crabtree creek receives several tributaries; they are torrents which fall into it with great impetuosity. On both sides of its valleys run flats, eight or ten yards wide, which are intersected by rugged bluffs, from 100 to 200 feet high, which divide them into isolated portions, the bluffs on one side of the stream, lying, in general, opposite to the flats on the other, and the two banks presenting an alternate succession of the same features.

Such are the main streams which, in this section, descend from the two sides of the Alleghanies.

To conduct the canal across this summit ground, we must 1st. Select the best passage for it through the little Back Bone, by leading it either from the valley of Savage river, to that of Deep creek, and from that of Crabtree creek to the same, or from the valley of Crabtree creek, to that of the little Youghiogheny. 2nd. Ascertain which of these passages presents the shortest route from the mouth of Savage river, to that of Bear creek. 3d. Ascertain, as the most essential element of the whole project, whether a supply of water, sufficient for all the purposes of the canal, can be procured at this elevation.

We shall point out the several passages which lead through the

little Back Bone, beginning by those which lead from the valley of Savage river, to that of Deep creek. But, in the first place, it is necessary to state, that a base-mark has been fixed on the bridge of Deer creek, three feet above its bottom: to this have been referred all the levels taken on this section of the canal.

Monroe run, a tributary of Savage river, and Meadow mountain run, a tributary of Deep creek, offer the only ravines through which Deep creek, and Savage river, can be connected. For this purpose, it will be necessary to run a tunnel through the little Back Bone.— Supposing its bed on a level with the base-mark, and a deep cut of thirty-five feet at each extremity of it, this tunnel would extend five miles, $835\frac{1}{3}$ yards, in length. The greatest elevation of the ridge, above the bed of the tunnel, would be 213 feet. From its eastern extremity to the mouth of Monroe run, in Savage river, the descent is 983 feet, on a length of five miles $816\frac{2}{3}$ yards. From the mouth of Monroe run, to that of Crabtree creek, in Savage river, the descent is 109 feet, on a length of two miles, $216\frac{2}{3}$ yards. From the mouth of Crabtree creek, to that of Savage river, itself, in the Potomac, the descent is 340 feet, on a length of five and a half miles. The level of the mouth of Savage river lies, of course, 1,432 feet below the base-mark, and at a distance of twenty-one miles 327 yards from it, ascending the ravines of Savage river, and Monroe run, and descending those of Meadow mountain run, and Deep creek.

Meadow Mountain Run flows through glades, but Monroe Run falls down a ravine, whose upper portion is very steep and narrow; it widens, however, as it descends, and presents a succession of bluffs and flats, which extends to twenty-five yards in breadth, the bluffs hang perpendicularly over the stream. At the mouth of Monroe Run, Savage river is only thirty-three yards wide, and a dam might easily be thrown across to form a reservoir.

This passage is the only one which leads from the valley of Savage river to that of Deep Creek.

We shall now examine those which connect the valley of Crabtree Creek and Deep Creek.

The first lies between the middle fork of Crabtree creek and the Meadow mountain Run, and would require a tunnel running under the Little Backbone and Hooppole Ridge. Supposing its bed on a level with the base mark, and an open cut to the depth of thirty-five feet through the height, the tunnel would extend three miles $1,333\frac{1}{3}$ yards in length. From its eastern extremity to Crabtree Creek, in following the windings of the middle fork, the descent is 1,012 feet, on a distance of six miles $1,333\frac{1}{3}$ yards, and from the mouth of the middle fork to the mouth of Savage River in the Potomac, the descent is 420 feet, on a distance of six miles 685 yards. The height of the ridge above the bed of the tunnel would be 210 feet; and the ravine of middle fork differs little from that of Monroe Run; its general breadth is about twenty-seven yards, and its banks are rugged. The whole distance from the base mark to the mouth of Savage River would be, by this passage, nineteen miles 915 yards.

Three passages run through the Little Backbone, from three branches of North Glade Run, a tributary stream of Deep Creek, to the valley of Crabtree Creek.

The first opens on the western branch of the middle fork, and would require a tunnel through the Hooppole Ridge. Supposing its bed on a level with the base mark, and an open cut to the depth of thirty-five feet, through the height, the tunnel would extend three miles $125\frac{1}{3}$ yards in length, and the greatest height of the ridge above its bed would be 144 feet.

From the second branch of North Glade Run, a passage might be opened to the eastern branch of the middle fork, by a tunnel of the same nature, and on the same level as the former; it would extend three miles eighty-three yards in length, and the greatest height of the ridge above its bed would be 184 feet. But from its eastern extremity there would be a descent of 280 feet, on a distance of one mile 366 yards.

From the third branch, a passage might be opened to Rock Camp Run, by a tunnel four miles in length. The greatest height of the ridge above its bed, would be 222 feet; but from its eastern extremity to Crabtree Creek, the descent would be 728 feet, on a distance of two miles $166\frac{2}{3}$ yards, and through a very narrow, rugged, and precipitous ravine.

The north fork of Deep Creek rises near the summit of the Little Backbone, at Whetsall's Springs, 105 feet above the base mark. The spring of Savage Lick Run, a tributary stream of Crabtree Creek, rises opposite to it. A tunnel which would join them, with its bed on a level with the base mark, and an open cut through the height at each of its extremities to the depth of thirty-five feet, would extend two miles 1,083 yards in length. From its eastern extremity to Crabtree Creek, the descent would be 452 feet on a distance of two miles 100 yards, and the greatest height of the ridge above its bed would be 148 feet.

Three more passages have been surveyed between the tributaries of the north fork, and those of Crabtree Creek.

The first unites Hinch's arm to Glade Road Run, by a tunnel one mile 1,166 yards in length, on a level with the base mark. The distance from its eastern extremity to Crabtree Creek is 1,500 yards, and the greatest height of the ridge above its bed 205 feet.

The two others unite Dry arm and Dewickman's arm, with small ravines of Crabby's arm, a tributary stream of Crabtree Creek, which rise opposite to them. The tunnel which would be required at Dry arm, would extend one mile 916 yards in length, and the greatest height of the ridge above its bed would be 271 feet. The tunnel of Dewickman's arm would extend one mile $683\frac{1}{3}$ yards in length, and the greatest height of the ridge above its bed would be 227 feet. These two tunnels on a level with the base mark, are the shortest of those that we have enumerated on any of the designated routes of the canal.

Two passages have been surveyed and levelled, to open a communication between Crabtree Creek and the Little Youghiogeny: the one from Crabby's Arm, and the other from Wilson's Fork to the latter stream. They would each require a tunnel. Supposing its bed on a level with the base mark, the tunnel from Crabby's Arm would extend three miles 1,538 yards, and the tunnel from Wilson's Fork four miles 300 yards, in length, with an open cut at each of their extremities, to the depth of thirty-five feet. The greatest height of the ridge, above the bed of the tunnel from Crabby's Arm, would be 444 feet, and above that of Wilson's Fork 253 feet. The distance from their eastern extremities to Swan's Mill would be two miles, with a fall of 114 feet. From Swan's Mill, to the mouth of Crabtree Creek, the descent would be 940 feet, on a distance of seven miles 966 yards; from the mouth of Crabtree Creek, to that of Savage River, in the Potomac, the distance five miles 830 yards, and the descent 378 feet. Thus, from the eastern extremity of the tunnel, to the mouth of Savage River, the total descent is 1,432 feet, on a distance of fifteen miles eighty-six yards, and of these two tunnels, the one by Crabby's Arm is the shortest.

Other passages have also been examined, to open communications between Deep Creek and the waters of the Little Youghiogeny. The bed of the tunnels required for this purpose, was fixed seventeen feet above the level of the base mark. One of these tunnels joined Westlick Run, to one of the branches of the south fork of Deep Creek; its length was two miles 583 $\frac{1}{2}$ yards, and it required a deep cut, on the side of Westlick Run, of the length of one mile 600 yards, and another on the side of South Fork, of the length of two miles 50 yards. Another tunnel might join the Little Youghiogeny itself, to South Fork; it would extend one mile 1,300 yards in length, and require an open cut of one mile 1,566 $\frac{2}{3}$ yards, towards the Little Youghiogeny, and two miles 300 yards towards the South Fork. The height of the ridge, above the first tunnel, would be 143 feet, and above the second, 183 feet. Such are the chief passages through which a communication might be opened between the waters which descend from the eastern and western sides of the Little Backbone. In recapitulating the several routes, by which the canal may be directed through them, we will observe, that they all extend from the mouth of Savage River, either by the valley of that stream, or Crabtree Creek, to the base mark on the bridge of Deep Creek; and that the descent or fall of the canal, by all these routes, is 1,432 feet.

1st. The first ascends by Savage River, Monroe Run, Meadow Mountain Run, and Deep Creek. Its total length, from the mouth of Savage River to the base mark, is twenty-one miles 325 yards. The length of the tunnel, which it requires through the ridge, is five miles 833 $\frac{1}{2}$ yards, and the height of the ridge above its bed, 213 feet.

2d. The second ascends by Savage River, Crabtree Creek, Middle Fork, Meadow Mountain Run, and Deep Creek. Its total length is nineteen miles 915 yards. The length of the tunnel, which it re-

quires through the ridge, is three miles $1,333\frac{1}{2}$ yards, and the height of the ridge, above its bed, is 210 feet.

3d. The third ascends by Savage River, Crabtree Creek, Middle Fork, the western branch of the same Fork, North Glade Run, and Deep Creek. Its total length is twenty miles 1,128 yards. The length of the tunnel which it requires through the ridge, three miles 125 yards, and the height of the ridge, above its bed, 144 feet.

4th. The fourth ascends by Savage River, Crabtree Creek, Middle Fork, the eastern branch of the same, North Glade Run, and Deep Creek. Its total length is twenty miles 1,306 yards. The length of the tunnel which it requires through the ridge, three miles eighty-three yards; the height of the ridge, above its bed, 184 feet.

5th. The fifth ascends by Savage River, Crabtree Creek, Rock Camp Run, North Glade Run, and Deep Creek. Its total length is nineteen miles 630 yards. The length of the tunnel which it requires through the ridge, four miles, and the height of the ridge, above its bed, 222 feet.

6th. The sixth ascends by Savage River, Crabtree Creek, Savage-Lick Run, North Fork, and Deep Creek. Its total length is twenty-one miles 435 yards. The length of the tunnel which it requires through the ridge, two miles 1,083 yards, and the height of the ridge, above its bed, 148 feet.

7th. The seventh ascends by Savage River, Crabtree Creek, Hinch's Arm, Glade Road Run, North Fork, and Deep Creek. Its total length is twenty-one miles 1,158 yards. The length of the tunnel which it requires through the ridge, one mile 1,166 yards, and the height of the ridge, above its bed, 205 feet.

8th. The eighth ascends by Savage River, Crabtree Creek, a ravine of Crabby's Arm, Dry Arm, North Fork, and Deep Creek. Its total length is twenty-one miles 1,868 yards. The length of the tunnel which it requires through the ridge, one mile 916 yards, and the height of the ridge, above its bed, 271 feet.

9th. The ninth ascends by Savage River, Crabtree Creek, a ravine of Crabby's Arm, Dewickman's Arm, North Fork, and Deep Creek. Its total length is twenty-one miles 718 yards. The length of the tunnel which it requires through the ridge, one mile $683\frac{1}{2}$ yards, and the height of the ridge, above its bed, 227 feet.

From the base-mark, the localities of the ground leave us a choice between three routes, to the mouth of Bear Creek.

The first runs by Deep Creek, Buffalo marsh run, Rocklick run, a tributary stream to the western branch of Bear Creek, that western branch to its mouth in Bear Creek, and Bear Creek itself to the Youghiogeny. This route crosses by a tunnel, the ridge which divides the heads of the Western and Eastern branches of Bear Creek. This tunnel, beginning at McHenry's, and with an open cut of the depth of 35 feet at its southern extremity near McHenry's, and at its northern extremity, would extend about two miles in length, and the greatest height of the ridge above its bed, supposed on a level with the base-mark, would be about 170 feet. The whole ground along

this route, except where it passes through the gap of Winding ridge, is of a soft and good quality; and its whole length from the base-mark, to the mouth of Bear Creek, would be only twelve miles.

A second route might turn round the west of Marsh Mountain, and wind about Panther's Point; it would then turn successively round the heads of the ravines of Hoy's Run, Steep Run, Sang Run, Gap Run, and descend along Friend Run, a tributary of the Western branch of Bear Creek. This route is very circuitous, and in winding round Panther's Point, runs through a rocky and difficult ground. It would only be shortened by running an aqueduct 250 feet high, and above a quarter of a mile long, through the Western branch of Hoy's Run, or a tunnel half mile in length from that Western branch to the head of Steep Run. The height of the ridge above the bottom of that tunnel, would be about 250 feet. A level was also run over a bend of ground at Hoy's pine bottom, to endeavor to shorten it, and avoid the winding round of Panther's Point, but to run the canal over this line would require a deep cut of 1,431 yards in length, and of the depth of 99.06 feet at the highest point of the ridge. The total length of this route would be 24 miles.

The third route, descending the valley of Deep Creek, from the base-mark, might follow the eastern shore of the Youghiogheny to the mouth of Bear Creek, crossing successively on aqueducts, Hoy's Run, Steep Run, Sang Run, Gap Run, Bear Creek, and the smaller tributary streams of that river. The ground along this route is rocky and difficult for one mile and $\frac{1}{2}$, from Deep Creek to Hoy's Run; then light and easy for four miles, to Gap Run; then rocky for the space of six miles, following the Western bank of Winding ridge; then for two and a quarter miles light and easy to the mouth of Bear Creek. The total length of this route would be 20 miles.

We have not mentioned a fourth route, which, from the base-mark, running by a tunnel, through Negro Mountain, might unite Deep Creek with the Eastern branch of Bear Creek, because it would require a tunnel of 8 miles in length; and that the height of the ridge above its bed, would be from 400 to 500 feet in the most elevated portion. The length of this route would also pass 20 miles.

Such are all the routes which lead from the valleys of Savage river and Crab-tree Creek, in passing by that of Deep Creek to the mouth of Bear Creek, in the Youghiogheny. We must now examine those which, departing from the head of Crab-tree Creek, reach the same point in passing by the valleys of the Little and Great Youghiogheny.

For this purpose the canal should follow the valley of Savage river, from the mouth of that stream, and ascend along Crab-tree Creek till it reaches two miles above Swan's mill, where opens the eastern extremity of the tunnel of Crabby's Arm, mentioned page 27, as the shortest of those by which Savage river can be connected with the Youghiogheny. Passing through that tunnel, it would descend the valleys of the little and great Youghiogheny, winding along their

eastern side. When it reaches the mouth of Deep Creek, it may follow one of those three directions.

1st. Ascend Deep Creek and Buffalo-marsh Run, following the first of the three routes, which we have just indicated for passing from the base-mark, to the mouth of Bear Creek. This route, as we have seen, presents a tunnel two miles in length: The total distance over which it runs, is as follows:

From the mouth of Savage river to the east extremity of the tunnel of Crabby's Arm, - 15 miles 86 yds.

From thence to the mouth of Deep Creek, - 22 miles 426 yds.

From thence to the mouth of Buffalo-marsh Run, 6 miles

From thence to the mouth of Bear Creek, - 11 miles 440 yds.

Total distance from the mouth of Savage river to that of Bear Creek - - - -

54 miles 952 yds.

This route would present two tunnels, one three miles 1,538 yards in length at Crabby's Arm, and the other two miles in length between Buffalo-marsh Run and Rocklick Run—total nearly 6 miles of tunnelling.

2d. The canal might cross Deep Creek, and follow the 2d route indicated for passing from the base-mark to Bear Creek, by winding round Panther's Point, and the heads of the ravines of Hoy's Run, Steep Run, Sang Run, Gap Run and Friend Run, to the western branch of Bear Creek—its total length would be:

From the mouth of Savage river to that of Deep

Creek, as above, - - - - 37 miles 512 yds.

From thence to Bear Creek, - - - - 17 miles 660 yds.

Total length 54 miles 1172 yds.

This route presents only one tunnel, of the length of 3 miles 1,538 yards, or nearly 4 miles at Crabby's Arm. It may also be shortened, as mentioned above, by an aqueduct $\frac{1}{4}$ of a mile in length, and 250 feet high, or a tunnel $\frac{1}{2}$ mile in length, with 250 feet of height of ridge above its bed.

3d. The canal might follow this third route indicated above, after crossing Deep Creek, by keeping along the eastern side of the valley of Younghiogeny, and crossing its tributaries on aqueducts. Its total length would be as follows:

From the mouth of Savage River to that of

Deep Creek, as above - - - - 37 miles 512 yds.

From thence to Bear Creek - - - - 13 miles 660 yds.

Total length - - - - 50 miles 1172 yds.

This route would require, like the preceding one, one tunnel of 3 miles 1,538 yards, or nearly 4 miles in length.

From the comparison of these three routes, it is evident that the second is preferable to the first. Their length is nearly the same, but the first requires six miles of tunnelling and two tunnels, whilst the second requires only one tunnel of something less than four miles in length. The third is shorter again by four miles than the second, and passes by the same tunnel. Aqueducts must be constructed on this route to cross Hoy's Run, Steep Run, Sang Run, Gap Run, and Bear Creek; but by the successive dropping of its levels, they will require but a small elevation; and the waters of these runs, and of the Great Youghiogeny, may be raised, and used to feed the canal, an advantage which the other routes do not offer. It should also be observed, that these Runs are not above 200 or 300 feet wide at their mouths, in the Youghiogeny. The third route is therefore preferable to the two others, on the hypothesis of uniting the mouths of Savage River and Bear Creek, through the valleys of the Little and Great Youghiogeny.

We will now compare this route, which we will call the Youghiogeny route, with those which lead from Crabtree Creek to Deep Creek.

Nine routes, which all unite at the base mark, have, as we have stated before, been examined for this purpose. Their length varies only from 19 to 22 miles, but their tunnels present a much greater difference. The longest extends 5 miles $83\frac{1}{3}$ yards, or about $5\frac{1}{2}$ miles; and the shortest 1 mile $68\frac{1}{3}$ yards, or about $1\frac{1}{3}$ mile in length. The last should certainly be preferred; its whole length is 21 miles 718 yards; and the greatest height of the ridge, above its tunnel, is 227 feet. We shall call it Dewickman's Arm route.

We have also observed, that there are three routes from the Base mark to the mouth of Bear Creek. The first runs 12 miles by Buffalo Marsh Run, and Rock Lick Run. It is the shortest, but requires two miles of tunnelling. Were it not for this obstacle, it offers a favorable ground for digging the canal. The second, winding round Panther's Point, and the heads of Hoy's Run, Steep Run, Sang Run, Gap Run, &c. is 24 miles long, and is objectionable, not only from its length, but from the difficulties which it presents in turning Panther's Point. The third, by the valleys of Deep Creek, and of the eastern branch of the Youghiogeny is 20 miles long; it is shorter by four miles than the second, and requires no tunnelling. In this respect it is superior to the first; for two miles of tunnel costs more than eight miles of canal, which is the difference of their length. The passage of an active trade will also meet with more delay on a tunnel of two miles, unless its dimensions are very large, than on four or six miles of canal. This route possessing besides, over the two others, the advantage of feeding the canal below the mouth of Deep Creek, by raising the waters of the Great Youghiogeny and its tributaries, is preferable to them in all respects.

If we add the 20 miles of this route to the 21 miles 718 yards of Dewickman's Arm route, we shall have for the whole length of the canal, passing along Crabtree Creek, Deep Creek, and the valley

of the Youghiogeny, 41 miles 718 yards, with one tunnel $1\frac{1}{3}$ mile in length, and the height of the ridge above it 227 feet. We shall call this route Deep Creek route, in opposition to the Youghiogeny route.

To decide between these two routes, which alone can enter in competition, we must compare their length, and the time, expense, difficulties, and trouble of their construction, viewed in a general manner.

The length of the Deep Creek route is 41 miles 718 yards; that of the Youghiogeny route 50 miles 1172 yards; the former is therefore shorter by nine miles than the other.

The tunnel from Dewickman's Arm on the Deep Creek route is 1 mile $683\frac{1}{3}$ yards in length, and the height of the ridge above its bed is 227 feet. The tunnel betwixt Crabby's Arm and the Little Youghiogeny on the Youghiogeny route, is 3 miles 1533 yards in length, and the height of the ridge above its bed is 464 feet. The former requires 2 miles $855\frac{2}{3}$ yards less of tunnelling, and the height of the ridge above the bed of its tunnel is 237 feet less. With respect to the expense of tunnelling, the route by Deep Creek is therefore preferable to the other.

As to the deep cuts at each extremity of these tunnels, the deep cut at the western extremity of the tunnel towards the Little Youghiogeny, is 2 miles 930 yards in length. The deep cut, at its eastern extremity, towards Crabby's arm is 900 yards. The whole deep cutting on the Youghiogeny route is thus 3 miles 70 yards.

The deep cut at the western extremity of the other tunnel towards Deep Creek extends 5 miles 1096 yards. The deep cut at its eastern extremity towards Dewickman's Arm, 572 yards. Total 5 miles 1668 yards.

The Youghiogeny route will therefore require 2 miles 1598 yards less of deep cutting, than the other, at the extremities of its tunnels. But this advantage is not to be weighed with the expense of 2 miles 855 yards more of tunnelling.

In comparing the nature of the soil on each of these routes, and the obstacles which it may present, it must be remembered that their eastern portion, from Savage River to Crabby's Arm, and their western portion from the mouth of Deep Creek to that of Bear Creek are the same. In the intermediate space the ground is equally favorable and easy to work on both routes.

On the whole comparison of their respective lengths—of the time necessary to pass through the one or the other of the obstacles which they meet, and the expense and probable trouble of their construction, we believe the Deep Creek route preferable to the route by the Youghiogeny.

Our next task must be to compare the supplies of water which the canal may receive on either of these routes, and this will lead us to a detailed investigation of the resources which are offered by the water courses of the country, to feed the middle section, and summit level of the proposed canal.

Savage river and its tributary, Crabtree Creek, may feed the eastern branch of the middle section, and the great Youghiogeny its

western branch. The summit level must draw its resources from Deep Creek and the heads of the little and great Yonhiogeny. These streams were all gauged in 1824, at their lowest stage. We will give, in a general manner, the result of these operations: the minimum, in cubic feet of water, that flows through each stream in a second.

Eastern Branch of the Middle Section.

cub. ft. 100ths.

Savage river gave, on the 28th September, below the mouth of Crabtree Creek, in a second,	-	-	17	73
Savage river gave, on the 28th Sept. at its mouth (If had, however, rained this day.)	-	46	09	
Do. Do. 2d Sept. below Monroe Run	28		62	
Monroe Run gave, on the 28th Sept. at its mouth	-	00	88	
Do. Do. 16th Sept. do.	-	2	28	
Crabtree Creek gave, on the 14th Sept. at Swan's mill	00		97	
Middle Fork gave, on the 15th Sept. at its mouth, in Crabtree Creek	-	00	84	
Rock-Camp Run gave, on the 2d Sept. do.	do.	00	12	
Savage-Lick Run gave, on the 14th Sept. do.	do.	00	33	
Crabby's arm gave, on the 17th August, do.	do.	00	24	
Wilson's Fork gave, on the 17th August, do.	do.	00	35	

If we consider, that the water consumed in the lockage of this branch is supplied from the summit level, these streams turned into reservoirs by dams thrown across the tributaries of Crabtree Creek and Savage river, above the mouth of that creek, will serve to supply its losses from filtrations and evaporation. Between the mouth of Crabtree Creek and the Potomac, on a distance of $5\frac{1}{2}$ miles, Savage river, which gives 17.73 cubic feet, in a second, at its lowest stage, will serve for this purpose. In the remaining $9\frac{1}{2}$ miles from the tunnel to the mouth of Crabtree Creek, the middle fork gives 0.84 cubic feet; Rock Camp run 0.12 cubic feet; Savage Lick Run 0.33 cubic feet; and Crabtree Creek itself, 0.97 cubic feet, at Swan's mill, at their lowest stages: total, 2.26 cubic feet. Reservoirs may, besides, be formed in the middle fork, Savage Lick Run, and Rock Camp Run. Filtrations may also be prevented, in a great degree, by a careful construction of the bed of the canal: and, from observations taken in the Summer of 1824, the loss from evaporation did not exceed the quantity received by Summer rains. It may also be observed, that any deficit will prove to be amply supplied by the waters of the summit level.

From the mouth of Savage river, the canal may be supplied from the north branch of the Potomac, which, on the 18th September, gave 106 cubic feet in a second; and a great reservoir may be formed in it above the mouth of Savage river. From this point, therefore, it needs no longer the waters of Savage river nor of its tributaries.

And if we except the waters required for its lockage, which will be

supplied from the summit level, this branch of the middle section may be fed, in a great degree, by the streams which fall into it.

Western Branch of the Middle Section.

This portion of the canal begins in Deep creek, five miles below the Base mark, and ends at the mouth of Bear creek. The length is $14\frac{1}{2}$ miles; and, like the former branch, it will receive from the summit level the waters required for its lockage.

Hoy's Run, Steep Run, Sang Run, and Gap Run, may be employed to feed it, and repair its losses; but these streams have not been gauged. They may, nevertheless, offer some resources for reservoirs. Bear creek may also form a great reservoir, by damming its valley, and feeding the western section of the canal, but cannot feed the western branch of the middle section, from the difference of their levels.

Deep Creek is the only stream of any importance whose waters may supply the losses of this branch from filtrations and evaporation; we should, therefore, examine accurately the means which it offers for this purpose. Its usual depth under the bridge is three feet; but in its freshets it rises to twelve feet. High freshets generally occur in this stream twice or thrice a-year, and last from three to four days: when the rains last so long, it gives, during that time, from 400 to 500 cubic feet a second. During the most unfavorable season it still has freshets, less considerable, but which, nevertheless, give it a mean discharge about 100 cubic feet in a second, each time: these occur from six to eight times a year. In the dryest months it gives, under the bridge, from 10 to $5\frac{1}{2}$ cubic feet a second: on the 27th August, 1824, it gave 5.12 cubic feet, which was the lowest quantity we ever found.

Supposing a dam erected across Deep Creek, at the head of its rapids, and five miles below the base mark, its basis would be $19\frac{1}{2}$ feet below that mark; its length would be $136\frac{2}{3}$ yards, and to raise its waters four feet above the base mark, its height should be $23\frac{1}{2}$ feet. This dam would raise the waters of Deep Creek, so as to overflow an area of 948,924 square yards, from accurate surveys. The prism of this reservoir, comprised between its surface and a horizontal plane, run three feet below the base mark, would be seven feet high, and contain, in capacity, 2,214,156 cubic yards. In less than three months of the rainy season, if we allow only 9 cubic feet, or one-third of a cubie yard a second, to the average supply of Deep Creek, this reservoir would be filled. It would be filled in less than five months in Summer, if the stream yielded at the rate of five cubic feet. Thus, every year, and for nine months of navigation, from the middle of March to the middle of December, we may depend on a supply equal to twice the capacity of this basin, or 4,428,312 cubic yards. This is equivalent to 492,034 cubic yards a month, and supposes only a mean supply of $5\frac{1}{8}$ cubic feet a second. This is the minimum of what Deep Creek can supply to repair the losses of the western branch of the middle section, from filtrations and evaporation. To

ascertain its sufficiency, we must examine next what those losses may amount to.

The length of this section is $14\frac{3}{4}$ miles—supposing it 5 feet deep, 28 feet broad at the bottom, and 44 feet at the surface of the water, the prism of its capacity, will have a base of 20 cubic yards, on a length of $14\frac{3}{4}$ miles, equal to a cubic of 519,200 cube yards. This will be filled in the first days of March, without deranging the economy of water which we have just analysed. We have already observed, that Deep Creek may supply every month a cube nearly corresponding to this or 492,034 cubic yards, at the minimum rate, and lowest state of its flow: we must now examine whether this supply will suffice every month to the filtrations and evaporation of $14\frac{3}{4}$ miles of Canal.

Without entering into minute calculations, which properly belong to the report accompanying the final project of the canal, we will state generally the most positive results which experience has given as to the joint amount of filtrations and evaporation. Having ascertained that no experiments of this nature have been tried on the Erie Canal, where the supply of water was found evidently more than sufficient, we were obliged to consult the results of those canals constructed in Europe, under a climate, which, in summer, comes nearest to our own. We have selected for this purpose, the canal of Narbonne, in the south of France. Narbonne and Baltimore, compared as to climate and rain, are as follows:

Narbonne, lat. N. $43^{\circ} 11'$ { mean, greatest heat, 95°
(from observations made { mean temperature, 60°
during twenty years.) { mean, greatest cold, 24°
} } Mean quantity of rain,
 $29\frac{3}{100}$ in.

Baltimore, lat. N. $39^{\circ} 17'$ { mean, greatest heat, $94\frac{5}{100}$
(from observations made { mean temperature, $52\frac{2}{100}$
1817—1822, by Mr. { mean, greatest cold, $0\frac{12}{100}$
Lewis Brantz, of Md. } } Mean quantity of rain,
 $38\frac{6}{100}$ in.

Of all such works, the canal of Narbonne has given most trouble to its Engineers, from its excessive filtrations and loss of water in the gravelly soil through which it is run. It is a branch from the canal of Languedoc to the City of Narbonne, three miles in length. As soon as it was opened, in 1788, it lost the value or contents of its prism in a few days, and overflowed the surrounding country; in 1789, it still lost the value of its prism in 6 days; and in 1800, it lost it in 18 days, or the value of its prism, and $\frac{2}{3}$ every month; ($16\frac{2}{3}$ times its contents in 10 months navigation.) This evaluation is the result of careful and accurate observations: and, considering the climate and soil through which this canal runs, it may fairly be taken as a specimen of the maximum loss, which a canal can suffer, through filtrations and evaporation.

The ground through which runs the western branch of our middle section, is of a quality far superior to the country through which runs the Narbonne Canal. It is, for $6\frac{1}{4}$ miles, of an excellent quality; the remaining $8\frac{1}{2}$ miles run through a rugged and rocky soil, but clay

is every where at hand, to puddle the bed of the canal, if necessary. Supposing therefore, that its losses from filtrations and evaporation, equalled in one month the cube of its prism, or 519,200 cubic yards, this would certainly be their maximum, whilst the evaluation of 492,034 cubic yards of water, which we have given, as the supply from the reservoir of Deep Creek, in one month, is its minimum. For, it must be remembered, that we valued this supply from the lowest result, obtained at the lowest stage of Deep Creek, when it gave only 5 $\frac{1}{2}$ cubic feet in a second.

We have allowed no loss for the evaporation for the surface of the reservoir, as it will be compensated by the frequent rains which fall on the summit of the Alleghany. From observations made in July, August, September, and October, 1824, in the Valley of Deep Creek, we have ascertained that there fell,

From 19th to 30th July,	4 days of rain,	4.36 inch.	55°	mean temperature.
" 1 to 31 August,	8 days of rain,	2.31 "	63°	"
" 1 to 31 Sept.	12 days of rain,	3.15 "	51°	"
" 1 to 31 Oct.	9 days of rain,	3.19 "	44	"
From 19th July to 31st Oct.	33 days of rain.	13 "	10	

During 104 days, of which 33 were rainy, there fell 13.01 inches of rain. The evaporation was 0.10 inches a day, and during the 104 days, 10.40 inches; of course the rain more than supplied the loss of evaporation.

The temperatures marked above, are the mean temperatures of the rainy days. The highest temperatures in that Valley, during these months, were at midday, in July, 76°—in August, 74°—in September, 70°—in October, 72°. The lowest were at 6 in the morning; in July, 53°—in August, 44°—in September, 32°, and in October 25°.

From these observations, it is evident, that less evaporation is to be apprehended in the Valley of Deep Creek, than in regions more to the level of the Ocean: besides, by raising the dam which forms its reservoir, we might add to it a quantity of water, sufficient to supply all the loss of its evaporation and filtration. We will conclude these remarks on the reservoir of Deep Creek, by observing, that its surface lies below the mouths of its tributaries; and that they might, therefore, at small expense, be turned into reservoirs, to preserve the waters of the Valley, when (the great reservoir of Deep Creek being full,) they would otherwise escape over the dam. For this purpose, the dams of these small streams should have sluice gates, to distribute their supplies, whenever required.

Summit Level of the Middle Section.

From these observations it is evident, that the eastern and western branches of the middle section possess sufficient supplies to repair their losses from filtrations and evaporation. The first is 15 and the second 14 $\frac{1}{2}$ miles in length, and both 29 $\frac{1}{2}$ miles. If we subtract this length from that of the whole Deep Creek route, 41 miles 718 yards,

there will remain 11 miles 1158 yards, or about 11 $\frac{1}{3}$ miles. If we subtract it from the length of the Youghiogeny route, (50 miles 1172 yards,) there will remain 20 miles 1580 yards, or about 21 miles. These portions, on either of these routes, may be designated as their summit levels. On the Youghiogeny route, this portion might, perhaps, be dropped below the reservoirs of the Youghiogeny; but its length and expanse of water, which is our present object, would remain the same on either level. We should now examine, first, what means exist to feed these summit levels; second, what each of these requires to supply all its wants and losses; third, what are the respective advantages of the one and the other, and which is the most advantageous with respect to that question.

The Great and Little Youghiogeny and their upper tributaries, are the only streams of any importance which can feed either of these summit levels. Their levels, with respect to the base mark, and at different points, are as follow:

Level of the Great Youghiogeny, at the mouth of Deep Creek, ft.

below the base mark	- - - - -	250.
Do. at the head of Swallow Falls, do.	- - - - -	140.81
Do. one mile above the mouth of Indian Run, do.	- - - - -	70.50
Do. two miles do.	- - - - -	64.
Do. at the mouth of the Little Youghiogeny, do.	- - - - -	53.
Do. at the mouth of Snow Creek, two miles above the bridge, do.	- - - - -	36.69
Do. at Charles Glade's run, do.	- - - - -	28.72
Do. at the mouth of Cherry tree Creek, do.	- - - - -	26.18

Level of the Little Youghiogeny, where it is crossed by the state road, do.

44.

These levels being all below the base-mark, proved, that, whichever summit level we adopt, we must elevate the waters of the two Youghiogenies, by throwing great dams across them. The height of these dams would be lower, and a less quantity of lockage required, if we dropped the summit level of the Youghiogeny route; but the length of the tunnel from Crabby's arm, and deep cutting at each of its extremities, would then be proportionably augmented. For the sake of comparison, we have therefore supposed those two routes on a level. a passage was sought to open a communication between Deep Creek and the great Youghiogeny, through the opposite valleys of Indian run and Cranberry run. But, as the sources of these runs rise 226 feet above the base-mark, and the Youghiogeny at the Indian run lies 70.50 feet below it, a dam across the Youghiogeny, and a tunnel through the Roman Nose ridge, would both be indispensably required to accomplish this object.

An attempt was also made to lead Muddy Creek, which, from the west, falls in the Youghiogeny, to the summit level of these routes. But to lead it to the summit level of the Deep Creek route, it would be necessary to conduct it by a long aqueduct upwards of 140 feet high, and to lead it to that of the Youghiogeny, to run a feeder upwards of 30 miles, before it reached the mouth of Indian run, and which would absorb, by filtrations and evaporation, during its course, most

of the water which it would receive. Aqueducts through the ravines which it should wind round, would shorten it: but a great number of them would be required, and their construction would be very costly.

To ascertain the relative levels of Pine Swamp (where rise the springs of Muddy Creek of Youghiogheny, and Muddy Creek of Cheat river) and Deep Creek, a level was run to the summit of the ridge, which divides the waters of the Youghiogheny and Cheat river; this ridge parallel to the Roman Nose ridge, is called Snaggy Mountain. From this level, it appeared that the point, from which rise the highest springs of the two muddy creeks, is 75 feet above Pine Swamp, and 226.77 feet above the base-mark. This result, which proved the impossibility of running the canal in this direction from the mouth of Deep Creek, proved also that a reservoir of 3 or 4 miles area might be formed in the Pine Swamp, and that being raised at least 150 feet above the base-mark, a feeder might be led from it, following the eastern ridge of Snaggy Mountain, and joining Snowy Creek, after winding round the heads of the tributaries of the Youghiogheny, from Snowy Creek to Muddy Creek. This feeder would be from 8 to 12 miles long, and to form the reservoir a dam might be thrown through Muddy Creek of the Youghiogheny, at the gap where it breaks through Snaggy Mountain. This reservoir would afford an important supply, if those of the little and great Youghiogenies should prove insufficient to feed the summit levels. We shall now enumerate and measure the capacity of these several reservoirs, and give all the necessary details of them.

Reservoir No. 1, might be formed in the main branch of the great Youghiogheny, by throwing a dam across it, above the mouth of Cherry-tree Creek. It should be 40 feet high to raise the water six feet above the summit level, and allow to the feeder a descent of six inches per mile—height of its dam 40 feet, and length of its feeder, to the dam in Deep Creek, 16 miles.

Area of the reservoir, exposed to evaporation. 2,894,333 sq. yds.

Its prism, or capacity of water, above the base
mark, - - - - - 5,523,370 cub. yds.

No. 2 might be formed in Cherry creek by throwing a dam across it, above its mouth; the dam should be 40 feet high, and the length of its feeder 16 miles. For this, and all the following reservoirs, we shall allow the same data, 6 feet water above the basemark, and 6 inches descent per mile for their feeders.

Area,	- - - - -	1,752,000 sq. yds.
Prism,	- - - - -	3,170,148 cub. yds.

No. 3 might be found in Youghiogeny, between Cherry and Snowy creek, by throwing a dam through it above the mouth of Snowy creek. Height of the dam 50 feet, length of the feeder 14 miles.

Area,	- - - - -	1,475,444 sq. yds.
Prism,	- - - - -	2,796,518 cub. yds.

No. 4, receiving Laurel creek and Snowy Creek, might be formed

by throwing a dam across the latter, above its mouth. Height of its dam 50 feet, length of its feeder 14 miles.

Area,	- - - - -	3,444,444 sq. yds.
Prism,	- - - - -	6,536,666 cub. yds.

No. 5 might be formed in the great Youghiogeny, between Snowy creek and the little Youghiogeny, by throwing a dam across it above the mouth of the little Youghiogeny. Height of the dam 67 feet, length of the feeder 10½ miles.

Area,	- - - - -	2,833,332 sq. yds.
Prism,	- - - - -	5,555,555 cub. yds.

No. 6 might be formed in the little Youghiogeny by throwing a dam across its mouth. Height of the dam 67 feet, and length of the feeder 11 miles.

Area,	- - - - -	53,375 sq. yds.
Prism,	- - - - -	106,750 cub. yds.

No. 7 might be formed in Dunker's lick, by throwing a dam across it, above its mouth. Height of the dam 75 feet, and length of the feeder 9 miles.

Area,	- - - - -	1,055,555 sq. yds.
Prism,	- - - - -	1,851,851 cub. yds.

No. 8 might be formed in the great Youghiogeny, between the mouth of the little Youghiogeny, and the ledge, by throwing a dam across the ledge. Height of this dam 94½ feet, length of the feeder, 6½ miles.

Area,	- - - - -	2,770,666 sq. yds.
Prism,	- - - - -	5,303,555 cub. yds.

Areas of all the reservoirs,	- - - - -	16,279,149 sq. yds.
Prisms do.	- - - - -	30,844,413 cub. yds.

If we dispense with the two last reservoirs, whose dams are the highest and most expensive, the five remaining reservoirs above the mouth of the little Youghiogeny will contain—Area exposed to evaporation. 12,452,928 square yards, or $4\frac{2}{100}$ square miles, or $2,572\frac{4}{100}$ acres. Prism of their waters, 6 feet above the base mark, besides 6 inches allowed per mile of the length of the feeder of each reservoir for its descent. These are all available to supply the summit level 23,689,007 cubic yards.

These reservoirs are all independent of one another, and the higher ones may pour the surplus of their waters into the lower ones. Those numbered 3 and 5, in the great Youghiogeny, may be regarded as one, to which all the others can contribute when circumstances require it. The dam No. 3 might even be suppressed, which would reduce the number of dams to 5. But the proper location of these dams, as also their number and dimensions, will receive further investigation, which belong to the final project; their number will likely be reduced.

As to the total quantity of water which these basins might hold, if we suppose their main depth 16 yards, and a middle horizontal section run between the surface and bottom, equal in area to one half of

the upper surface, or to 6,226,464 square yards, (half of 12,452,928 square yards) it will amount to 99,623,424 cubic yards, or, in round terms, 100,000,000 cubic yards.

As to the time necessary to fill them, from observations taken with care, from 1817 to 1824, (inclusively) by Mr. Lewis Brantz, in the vicinity of Baltimore, Md. we have the following results:—In the course of eight years, from 1817 to 1824, there fell, on a mean average, yearly $59\frac{8}{100}$ inches. In 1822 there fell the smallest quantity, the summer was very dry, vegetation deficient, the crops of grain were short. The quantity of rain which fell that year was 29.20 inches. The greatest quantity which fell was in 1817. it amounted to 48.55 inches. Applying these data to the country round the summit level, and using only the results of the year 1822, the rain which fell in the three first and three last months of this year amounted to 16.70 inches, whilst that which fell in the same months of the year 1817 amounted to 18.40 inches. These 16.70 inches are equivalent to 0.465 cubic yds. Thus, during the three first and last months of each year, there will fall at least 0.46 cubic yards of rain on each square yard of the heads of the Youghiogeny, and an area of 217,391,304 square yards would be required to collect water for filling the 100,000,000 cubic yards of the reservoirs. This area amounts to $70\frac{18}{100}$ square miles; and the area of the valleys of the two Youghiogenies, above their junction, and the surface of the reservoirs amounts to much more. Besides, the heads of Cheat river could, perhaps, be brought to feed the reservoirs. These reservoirs once filled, the mass of waters which lies lower than the head of the feeders, will never alter, and the upper part, which feeds the summit level, will alone require to be renewed every year. We have seen that it contains 23,689,007 cubic yards.

The least quantity of water which the great Youghiogeny gave in 1824, under the bridge on the road from Mansfield to Morganstown, was, on the 21st September, 22.58 feet in a second. The little Youghiogeny gave, on the 20th September, 1824, at German bridge, 4.30 feet. Total given by those two streams, in a second, at their lowest stage, 26.88 feet.

This is the minimum which they can give to supply the reservoirs. In one month it would amount to 2,580,480 cubic yards; and, supposing what is most unlikely, that the two Youghiogenies and their tributaries should remain in this state, and give no more for six months, from May to October, it would supply the reservoirs with 15,482,880 cubic yards; and, as during the six preceding months, they would have received much more, they would be full at the opening of navigation, and receive every month at least 2,580,480 cubic yards as regular tribute.

We do not consider in this calculation the loss by filtration and evaporation; for, by raising the dams of the reservoirs, a quantity of water would be added to them, which would overbalance it.

We must now compare those supplies, the minimum of what the heads of the two Youghiogenies can furnish, with the maximum of what either of the two summit levels will require.

They will both require the same expense of water for lockage. We know that two lockfulls is the maximum expense for raising or lowering a boat, and eight minutes are required for its passage through a lock of thirty yards in length, $5\frac{1}{2}$ yards in breadth, and $2\frac{2}{3}$ yards in lift. Such a lock will contain 426.64 cubic yards, without deducting from it the draught of water of the boat, and its passage (at the maximum) will thus consume 853.32 cubic yards, or 854 cubic yards at most. Now, if the canal is navigated nine months, or 270 days a year, at ten hours a day, and that the locks of the summit level be kept in constant operation all that time, they might pass, allowing eight minutes for each boat, 20,250 boats, at an expense of water equal to 17,293,500 cubic yards, for the nine months, or 1,921,500 cubic yards a month. This maximum of water for the expense of lockage, is 658,980 cubic yards less than the minimum which the reservoirs will receive during that time.

The expense of water for lockage being 17,293,500 cubic yards, and the reservoirs containing 23,689,007 cubic yards, there will remain in reserve to supply the losses of the summit level, from filtrations and evaporation, 6,395,507 cubic yards.

The summit level of Deep Creek, extending $11\frac{1}{2}$ miles in length, will require 413,600 cubic yards to fill it; and, supposing that it loses by filtrations and evaporation the value of its prism every month, or nine times in the year, it will expend 3,722,400 cubic yards. The profile of its feeder having a supposed area of 10 square yards, and a length of $10\frac{1}{2}$ miles, it will consume, at the same rate, 1,668,200 cubic yards. Total consumption for nine months, 5,385,600 cubic yards. Retrenching this quantity from the surplus mass of the reservoirs, there will still remain 1,009,907 cubic yards, which, after supplying all the waste of lockage, and the losses of the summit level from filtrations and evaporation, will serve as an additional supply to repair those of the eastern and western branches of the middle section.

The Youghiogeny summit level, extending 21 miles in length, will lose from filtrations and evaporation, on the same principle, 789,200 cubic yards a month, (the value of its prism) and 6,652,800 cubic yards in nine months. It would thus absorb the whole surplus mass of the reservoirs, after the waste of lockage, and require a much greater expenditure of water than the Deep Creek summit level.

Thus the important advantage of a greater supply of water, by a length shorter by nine miles, of a tunnel shorter by two and a half miles, render the Deep Creek route, superior to the other; though the final surveys only can settle that point, yet at this stage of our operations we would recommend that route in preference. However, the analysis which we have just concluded, is a convincing proof that a canal by either of these routes over the chain of the Alleghanies, between the mouths of Savage River and Bear Creek, is perfectly practicable. The total distance from the mouth of Savage River to that of Bear Creek, will be forty-one miles at least, the rise from the mouth of Savage River to the base-mark, 1,432 feet; and the fall

from the base-mark to the mouth of Bear Creek, $956\frac{3}{10}\frac{5}{6}$ feet, total of lockage, $2,388\frac{3}{10}\frac{5}{6}$ feet.

The preparatory surveys executed on this middle section were performed by Captain M'Neill, of the United States' Topographical Engineers, and Mr. Shriver, Assistant Civil Engineer, employed by the United States. The talents and activity displayed by these gentlemen and their assistants, enabled the Board to collect the facts on which they rest their opinion of the practicability of this middle section, and of the best direction through which its route can be directed.

Capt. M'Neill was assisted in these labors by Messrs. De Russy, Cook, Trimble, Hazard, Dillahunty, Fessenden and Williams, Lieutenants of Artillery, whose scientific education, imbibed in the academy at West Point, was thus made valuable in the most efficient and useful manner, to their country and to themselves. Mr. Shriver was assisted by Messrs. Jonathan Knight, John S. Williams, Freeman Lewis and Joseph Shriver. The memoirs, surveys, and maps, of these gentleman, accompany this report.

Before we conclude the article relating to this middle section, we should give an analysis of two other routes which have been proposed for leading the canal over the Alleghany: the one by ascending Will's Creek, (a stream which falls in the Potomac at Cumberland) and descending to the Youghiogeny, by the valley of Casselman's River; the other by passing from the valley of the Potomac to that of Cheat River, and thus descending to the Monongahela.

1st. Two of the head springs of Will's Creek rise very near Flaherty Creek, which falls in Casselman's River, below Salisbury; the eastern is called Laurel Run, and the other Shock's Run. The shortest distance between Laurel Run and Flaherty Creek, is one mile 756 yards. It was measured from Wilhelm's saw mill, on Laurel Run, to Engle's saw mill on Flaherty Creek. The first is 156 feet lower than the second. A deep cut of 333 yards long, and 35 feet deep, in the highest part of it, on the side of Engle's saw mill, a tunnel of 1,483 yards, and another deep cut, 700 yards long, and of the same depth as the former, on the side of Laurel Run, would be required to unite those two streams. The greatest height of the ridge above the bed of the tunnel, would be 156 feet. This route offers great advantages, if we only considered the shortness of the distance and tunnel, but as to the essential condition of a sufficient supply of water, it is absolutely out of the question. Flaherty Creek, at Engle's mill, gives only 0.415 cubic feet in a second, and Laurel Run, at Wilhelm's mill, 0.600 cub. ft — (at their lowest stage in 1824.) They would only give, together, 1,015 cub. ft. per second, to feed the whole summit level. The details which we have already given in analyzing the Deep Creek route, and summit level, are sufficient to show the impracticability of receiving a canal by the route of Flaherty's Creek, with so small a supply of water.

As to the route between Shock's fork and Flaherty's creek, the season was too advanced to measure accurately its length, or the tunnel

and deep cuts which it would require. Their profile will be surveyed next season. This route would be longer than the other, and its summit level should be fed by the waters of Casselman's River above Salisbury, led by a feeder to the western extremity of the tunnel. This feeder, following the eastern side of Casselman's valley, would receive the waters of its tributaries between Salisbury and Flaherty's Creek. At their lowest stage these tributaries gave, altogether, five feet in a second, and Casselman's River above Salisbury, 15.33 cubic feet; total 20.33 cubic feet to feed the summit level. This quantity is not considerable when we consider, that, on a length of thirty miles from the summit level to Cumberland, the canal would have to draw most of its water from Casselman's River: for Will's Creek is a torrent, which, in the greatest part of its course, gives but little water in summer.

The length of this summit level, and of the route which the canal would thus trace, are less than by Deep Creek. As to their comparative heights, no survey was made in the season of 1824, to ascertain the difference. We shall now expose the reasons why the western branch of the canal was not led through the valley of the Monongahela (before concluding this part of our report.)

We have already seen that the valley of Cheat River, through which it would be necessary to pass to the Monongahela, is divided from the Upper Youghiogeny by a ridge whose greatest depression, at the head of the two muddy creeks, is 226.77 feet above the level of the base mark. A tunnel would, therefore, be necessary to pass from the valley of the Youghiogeny to that of Cheat River.

A single inspection of the map will show that the route of the canal would be very much lengthened by running its summit level from the heads of the north branch of the Potomac to those of Cheat River, and that it should be raised to a much higher level than on the route of Deep Creek. There is every reason to believe that the bed of Cheat River has a more rapid descent than that of the Youghiogeny, and that, where it forces through the Laurel Hill, it is already nearly on a level with the Youghiogeny at Connellsburg: for, at this gap, and a little above Furnace Run, it begins to be navigable. Its bed is here about 150 yards wide.

The highest floods in Cheat River do not rise above eight or ten feet at Furnace Run, and at its lowest stage in August and September, it is very low at this place, and often fordable. Indeed, Cheat River, to its junction with the Monongahela, receives no stream of any importance but the Big Sandy, whose supply is constant, but in the summer, is very trifling, even towards its mouth and in the lower part of its course. After descending along a rocky and very precipitous bed, Cheat River mingles its clear and limpid waters with the muddy stream of the Monongahela, whose bed and shores are all formed of alluvial soil.

The Monongahela has absolutely the same features as the Ohio; its shores are flat, but raised perpendicularly along both sides of the river to the height of fifteen or twenty-five feet above the line of water, form-

ed of a rich alluvial soil; they are corroded by the current, and when the river rises they crumble into it, and render its waters muddy. The floods of the Monongahela are considerable; at Brownsville it rises thirty-eight feet; whilst, at its lowest stage, its depth is only from twelve to fifteen inches on its highest bars. The two banks present all along a succession of flats and bluffs; the flats of one bank are generally opposite to the bluffs of the other, and the former are found where the river expands, whilst the latter close on its banks where it narrows. The chief tributaries of the Monongahela are on its right shore, George's Creek, below Mr. Gallatin's residence, Big Redstone, below Brownsville; and on the left, Ten Mile Creek. These streams flow constantly, but in summer give but a small quantity of water, an observation which is also applicable to many of the tributaries of the Youghiogeny.

If the western section of the Chesapeake and Ohio Canal cannot be led to the Monongahela, it will at least embranch with it at M'Kee's port, and perhaps when a denser population will render it desirable, a line of junction may be drawn between Cheat River and the valley of the Youghiogeny. It would be fed by a reservoir above the gap of Cheat river, and the constant springs which run from the western ridge of Laurel Hill.

Western Section.

This section begins at the mouth of Bear Creek, and ends at Pittsburgh, descending the valleys of the Youghiogeny and Monongahela to the Ohio.

From the mouth of Bear Creek to that of Casselman's River, the Youghiogeny runs in a very winding course between a succession of flats and bluffs, the flats of one shore being generally opposed to the bluffs of the other, the banks high and rugged where they wind in, and flat where they wind out. The two banks present nearly the same difficulties, the right shore, however, seems the best. The distance between those points, following the winding of the river, is about 16½ miles.

Casselman's river is about 100 yards wide at its mouth; it is a fine river, and will give a great deal of water to the canal. At the dryest season it offers from eight inches to one foot in depth; before joining the Youghiogeny it receives Laurel Hill Creek.

From the mouth of Casselman's River till you reach two or three miles above Connellsville, the Youghiogeny forces through Briery Mountain and Laurel Hill, and its bed is very deep. The left bank is very high and rugged, the right somewhat less. In this space of about 28½ miles, the canal must be frequently cut in a shelf on the sides of the valley, or run on embankments supported by a wall. The river has a fall of about sixteen feet at Ohiopyle falls; it is here about 150 yards wide.

Connellsville is considered as the head of navigation in the Youghiogeny. In the dryest season, it has here from eight inches to one foot in depth.

From Connellsville to Robstown, the river winds during twenty-four or twenty-five miles: on all this extent, the right bank is far preferable to the other. Except in three or four places, where you meet with bluffs, it consists of flats or gentle slopes, where the canal can be run without difficulty. As to these bluffs, they consist of schistose rock, easy to work. The only stream of any importance which joins the Youghiogeny between Connellsville and Robstown, is Jacobs' creek, and it gives but little water in dry seasons. That route is also intercepted by two or three deep ravines, which the canal must cross on aqueducts.

The distance between Robstown and M-Kee's port is about sixteen miles. Along this route the right shore remains preferable to the other; it consists of a succession of flats and spurs, which, being of a schistose nature and moderate height, will offer no considerable obstructions to the canal.

From M-Kee's port to Pittsburg, the right shore of the Monongahela offers a most favorable ground, except along two spaces of about a mile each, where rugged bluffs close on the river. The first is below Judge Wallis' and the field of Braddock's defeat; the second before reaching Pittsburg. The whole distance in following the right bank of the river, is between M-Kee's port and Pittsburg, from fifteen to sixteen miles.

The highest floods of the Youghiogeny occur between Casselman's river and Connellsville—they rise to eighteen feet. At Connellsville they rise from twelve to fifteen feet. Salt wells may be dug in its valley; coal and iron are abundant; and excellent materials for building, timber, and stone, are found all along it.

The preparatory surveys of this western section were not commenced during the last season (1824). They can alone fix the general route of the canal: they will be directed on the following bases:

From Bear creek, the canal must follow the right shore of the valley, descending along the Youghiogeny; and though it is most favorable, (presenting a rugged bank only for four or five hundred yards,) when it reaches Selby's port bridge, two lines of direction may be tried, one along the right, and the other along the left bank, to the old salt works. The depth and breadth of the valleys and ravines, which it will be necessary to cross on aqueducts, will be measured, and the location of these aqueducts, and of the dams to form reservoirs will be fixed.

If, between Selby's port and the old salt works, the left shore presents any advantages over the other, deserving the expense and trouble of crossing twice the Youghiogeny, the location and dimensions of two aqueducts, one at Selby's port, and one above the old salt works, will be determined, and a feeder led from Casselman's river to the latter.

From the old salt works to the Ohiopyle falls, the canal must follow the right shore, which is most favorable, and then crossing Indian creek, on an aqueduct, continue along the same bank to the paper mill four or five miles south of Connellsville. It will be pro-

per to ascertain whether its line should not leave the valley of the Youghiogeny, above the Ohiopyle falls, and running east, gain the southern branch of Indian creek, to rejoin the Youghiogeny by descending Indian Creek valley.

From the paper mill, the canal should be run at a sufficient elevation above the river, to leave the shore, and gain, if possible, the high level which lies east of Connellsville, in order to turn round the rugged bluff below that place. From thence, following the right shore, it will reach Robstown, after crossing on aqueducts Mount's creek and Jacob's creek. The localities and dimensions of these aqueducts must be determined, as well as the resources which these streams may afford to supply the canal, by turning them into reservoirs.

From Robbstown to M'Kee's port, keeping along the right shore, it must cross Sewickly creek over an aqueduct, whose dimensions and location must be determined. As this creek has two considerable branches, they must be examined, to determine whether reservoirs cannot be made in them.

From M'Kee's port to Pittsburg, the canal will follow the right shore of the valley of the Monongahela, crossing, in succession, Crooked Run, Turtle Creek, and Nine Miles Run, on aqueducts.

To ascertain whether from Paper Mill the right shores of the Youghiogeny and Monongahela are certainly the best, a level should be run along their valleys on the left shore, and the locations and dimensions of the dams or aqueducts which it would be necessary to run through the Youghiogeny at M'Kee's port, and through the Monongahela near its confluence with the Youghiogeny, in case this route was adopted, should be fixed and calculated.

It will also be essential to try whether the canal might not turn to the west of that narrow and rugged portion of the valley of the Youghiogeny, where it forces its way through Briery Mount and Laurel hill. For this purpose, a level should be run from Selby's port, and some point of a proper elevation, and cross the Briery Mount at the depression which it offers between the heads of Buffalo Marsh Run and the eastern branch of Sandy Creek. This level should then wind round the ravines of the head of the western branch of Sandy Creek, till it met the Laurel Hill at the spot where it might be crossed by the shortest tunnel. When it reached its western slope, it should run northwardly along its foot, to descend by one of its ravines to the Youghiogeny, opposite the paper mills.

On the whole, the western section of the canal, from the mouth of Bear Creek to that of the Monongahela, at Pittsburg, offers no obstacles which may not be surmounted at a reasonable expense; and the waters of the Youghiogeny, Bear Creek, and Cassellman's river, are amply sufficient to feed it. Large reservoirs may be formed in Bear creek and Cassellman's river, by throwing dams across them, and on the route from Cassellman's to the Paper mills, and at the mouth of the Youghiogeny in the Monongahela. The practicability of this section is out of question.

Its length will be about 100 miles, and its descent from Bear creek

to Pittsburg 584½ feet, as Pittsburg is 756 feet above the level of the ocean.

The investigation of the topography and water courses of the country, through which the Chesapeake and Ohio canal should run, and the results of our preparatory surveys, obtained up to the present moment, demonstrate that this noble enterprise is practicable; and although we have not yet sufficient data to calculate the expense of the work, there is every probability that it will not bear any comparison with the political, commercial, and military advantages which it will procure to the Union.

The total result of the length, rise, and fall of the canal, is as follows:

TOTAL LENGTH.

From the tide water in the Potomac to Cumberland, (from Messrs. Moore and Briggs's survey,) - - -	182 miles.
From Cumberland to the mouth of Savage river, (from Major Abert, U. States Topographical Engineer's survey,) - - - - -	27½
From the mouth of Savage river to that of Bear creek, by the Deep creek route, from the surveys of Capt. M'Niell, United States' Topographical Engineer, and Mr. Shriver, United States' Assistant Civil En- gineer - - - - -	41
From the mouth of Bear creek to Pittsburg, (from Mr. Shriver's computation,) - - - - -	100
	<hr/>
	350½ miles.

TOTAL RISE.

From tide water, in the Potomac, to Cumberland, (from the profile of Cumberland road,) - - -	537 feet.
From Cumberland to the mouth of Savage river, (from Major Abert's survey,) - - - - -	327½
From the mouth of Savage river to the Base mark, on the Deep creek summit level, (from Capt. M'Niell's survey,) - - - - -	1,432
	<hr/>
	2,296½ feet.

TOTAL DESCENT.

From the Base mark to the mouth of Bear creek - - -	956
From thence to the Ohio, at Pittsburg - - - - -	584½
	<hr/>
Total lockage for rise and descent - - - - -	1,540½

Total lockage for rise and descent - - - - - 3,837 feet.

OHIO AND ERIE CANAL.

[See Map, No. 17.]

This canal may be divided in two sections: 1st, The Southern, beginning at Pittsburg, and terminating at the summit level which divide those waters that pay their tribute to the Ohio, from those which pay it to Lake Erie. 2d, The Northern, beginning at that summit level and ending in Lake Erie.

SOUTHERN SECTION.

It should follow the right shore of the Ohio, from Pittsburg to the mouth of the Big Beaver, ascending the valleys of that river, and one of its heads, till it reaches the summit level.

From Pittsburg to the mouth of Big Beaver, the river winds for about thirty miles. Its right shore is formed of successive bluffs and bottoms; the latter generally form two beds parallel to the river and rising one above the other, as if the bed of the river had formerly been higher than it is at present. The upper bottom is never overflowed, and both are formed of an alluvial soil, most favorable for digging a canal. The bluffs consist of a schistose and clayey soil, which is easy to excavate; nor do they offer any considerable steep ground, except four miles below Pittsburg, on a length of four miles. The left shore possesses no advantages over the other, and offers the same features. the bottom of one shore generally lying opposite to the bluffs of the other. No stream of any importance joins the Ohio, from Pittsburg to the Big Beaver; but the river presents, in that interval, eighteen bars, which have but 10 or twelve inches of water in the dry season. At Pittsburg, its floods rise from 22 to 24 feet.

The Big Beaver, from its mouth in the Ohio, to the forks of Mahoning and Shenango, presents, like the Ohio, two flat bottoms on each of its shores; they both consist of a succession of bottoms and bluffs; the former offering a most favorable ground, and the latter consisting of a schistose and clayey soil, presenting no serious obstacle to the digging of a canal, except on the left shore at the spot where it joins the Ohio. This bluff is almost perpendicular, and consists of a mixture of clay and gravel.

The floods of the Big Beaver rise from eight to nine feet; and sometimes those of the Ohio back its course; it then rises and presents a level surface from the foot of the falls. These begin five or six miles from its mouth; their total descent is fifty one feet. From the mouth of the river to the forks of Mahoning and Shenango, its course winds about twenty miles. It receives no tributary of any importance, nor presents any ravine considerable enough to require an aqueduct for the canal in all this space.

The Mahoning and Shenango are the two upper forks of the Big Beaver. The first descends from the neighborhood of Warren, and rises west of this place, on the east side of a ridge which divides

its waters and those of Grand river, from those of the Cuyahoga. The Mahoning as well as the Shenango, has but a small current in the summer season, their beds are seldom more than 40 or 50 yards wide, and their depth at that time seldom passes 5 or 6 inches.

The Mahoning receives no stream of any importance; Musquito Creek, which joins it on the left shore, below Warren, is often dried up in Summer. The Shenango receives on its right shore the Pymatuning, which is not entirely dried up at its lowest stage. The two forks of the Shenango join at Greenville, the western fork is called Shenango Creek, and the eastern, Little Shenango, the latter receives on its right bank, Crooked Creek. Musquito Creek, the Pymatuning, Shenango Creek, and Crooked Creek, all rise in the swampy ground which here divides the waters which fall into the Ohio, from those which join Lake Erie. The head of Shenango Creek, and Crooked Creek, cross also, the Pymatuning swamp to the W. of Conneaut lake. At Greenville, the floods of the Shenango rise from 8 to 10 feet.

From the mouth of Mahoning to Warren, the distance is about 26 miles, in following its windings. As to the nature of its valley, its banks are generally flat, and favorable for digging a canal, as well as those of the Shenango, and of its tributary the Pymatuning.

In following from W. to E. the ground which divides the heads of the Big Beaver from the tributary streams of Lake Erie, it descends from Cuyahoga to Champion township, and ascends towards French Creek. Champion Swamp is thus the lowest part of this level; its elevation above Lake Erie, from a survey of Mr. Geddes is 342 feet, and from the report of Messrs. the Ohio Canal Commissioners, 214 feet above the mouth of Big Beaver in the Ohio; that mouth is, therefore, 127 $\frac{1}{2}$ feet above the level of Lake Erie. The rapids of Cuyahoga are from 97 to 100 feet above the Champion Swamp, and from 439 to 442 feet above Lake Erie. Conneaut Lake, E. of the head of Crooked Creek, is, from the level of Messrs. the Pennsylvania Canal Commissioners, 470 feet above Lake Erie.

Supposing the summit level of the canal in the Champion Swamp, it might be fed by the waters of the Cuyahoga from the rapids. Supposing it at Conneaut Lake or Pymatuning Swamp, it might be fed by the waters of French Creek, derived from Meadville, as we shall see below.

The Cuyahoga, below the rapids, cannot be turned into the Champion Swamp; its valley, until it reaches nearest to the basin of the Muskingum, is divided from Mahoning fork by a ridge, whose greatest elevation is 208 feet above the Champion. The pond which is on the portage from Cuyahoga to the Muskingum is — feet above the Champion Swamp. — feet above Nelson's township, and about — feet above the bridge at Warren.

The quantities of water given by these streams at their lowest stage in 1824, are as follows:

Big Beaver, at the Falls, and in that part only which runs through the races of the Falls, gave, from instructions received, - - - - - 88.888 ft. in a sec.

Shenango, above Greenville, 16th August, - 28.650

Mahoning, at Warren, 6th August, (*)	-	46.000
Silver Creek, a fork of Mahoning, 7th August, (E. Branch Kempt Creek at Stephens' mill, 0.664—Main Branch at Garrett's mill, 5.406,) -	6.070	
Cuyahoga, at its rapids, 8th August, -	56.148	
Outlet of Conneaut Lake, 16th August, -	6.293	
French Creek at Meadville, 17th August, -	221.008	
Do. do. 23d August, -	229.972	

NORTHERN SECTIONS.

The water courses which correspond with the heads of the Big Beaver, and fall into Lake Erie, are from west to east; Grand River, Ashtabula, and Conneaut Creek of the Lakes.

Grand River has dug for itself a bed, whose bottom is considerably lower than the general surface of the country to its east. At Bloomfield it is already 92 feet below the level of the turnpike. Its valley is deep, and its banks are very rugged, and formed of clay, without any tenacity. It offers some flats at the bends of the river, but in the intervals the banks are often perpendicular, on a height of 100 or 150 feet. At its lowest stage it has but little water—its tributaries on the right bank are almost dried up in Summer, but on the left bank, descending from a higher country, they are more permanent. When it reaches the natural dyke which borders on the Lake, Grand River, near Austinburg, runs suddenly to the west to join Lake Erie, at Fairport. Its greatest floods rise from 15 to 16 feet; in the lower part of its course they do not rise above 8 or 10 feet, and at its mouth are insignificant. By sinking two rows of piles in continuation of that mouth, a passage has been opened for the river through a sand-bar, which formerly obstructed it, and on which there was only 10 or 12 inches of water. But the piles are not closed, and an interval of 1 or $1\frac{1}{2}$ feet has been left between them; it would be proper to sink more piles in these intervals, especially to the W. as the reigning winds are from the S.W. and the neighborhood is subject to squalls from the N.W. This would secure an important port on this part of the Lake. The bottom is sand and gravel, the length of the passage between the piles is from 270 to 330 yards, its breadth 138 yards. A new bar is formed at the mouth of the channel, but has 8 or 10 feet above it.

The Ashtabula offers precisely the same feature as Grand River, as to the depth of its valley, below the general surface of the country, and the rugged and perpendicular character of its banks. Conneaut creek of the Lakes offers the same features, and, as well as Grand River, has but a small provision of water in the summer months, at least if compared to the Big Beaver, or Cuyahoga.

To the east of Conneaut creek, of the Lakes. Crooked creek, Elk creek, and Walnut creek, run successively into Lake Erie. The val-

(*) N. B. As it was not at its lowest stage, we give only $\frac{1}{2}$ of the result.

leys of these streams are broad, but their banks are high, and perpendicular in the lower part of their course; they are of soft slate in layers, which, worn by the water, present a perpendicular surface. The floods of these streames rise from 7 to 8 feet.

The soil of the country between these steams, consists, in general, of a clay, very favorable for digging a canal, except at Austinburg, where we meet a ridge, which would require a deep cut; there exist no obstacles any where to its excavation, and the preparatory surveys will determine whether we ought not to prefer it to the vailleys which run throught it.

Conneaut lake belongs to the valley of French creek, its surface is valued at 1600 acres or thereabouts; its outlet is called Conneaut creek, and falls in French creek, 6 or 7 miles below Meadville. Its inlet rises opposite the head of Conneaut creek of the Lakes. From the surveys of the Pennsylvania Canal Commissioners, a cut 14 or 15 feet deep, and 60 or 70 yards long, would join the waters of Conneaut creek, and Conneaut of the lakes. From the head of the inlet to that of the latter stream, the distance does not pass 2 miles. The same commissioners have ascertained that a feeder, beginning at French creek, above Meadville, might, by following the western side of its valley, and then the ravine of Conneaut creek, feed Conneaut lake, if we considered it as the reservoir of a summit level. By erecting a dam wherever required, round that lake, we might obtain a vast reservoir to feed both sections of the canal.

The description which we have given of the water courses and ground on both sections of this canal, proves that we have the choice of several summit levels; Champion swamp and Conneaut Lake are the chief.

The summit ground of Champion swamp, being 342 feet, and Conneaut lake 470 feet above Lake Erie, the former has over the latter the advantage of 128 feet less in height, and of course 256 feet less of lockage. But the resources in water of the Champion swamp summit level, as we have seen above, are only 56 feet in a second, from the Cuyahoga, and 6 feet from Silver creek, total 62 feet per second.

The resources of the Conneaut summit level amount to 221 cubic feet per second from French creek, which gives it a superiority of 159 cubic feet per second over the other. Reservoirs may and ought also to be found in the Cuyahoga and French creek, and a much greater depth of water can be collected, at little expense, in Conneaut lake, by running dams in certain parts of its border. Its mean depth has not been sounded.

Preparatory and comparative surveys must determine our choice between these two summit levels, and combine their several advantages with those of the several routes which may lead to them. The slender means of the Board did not allow them to begin those surveys in 1824; of course, they cannot recommend either in preference to the other, as they do not possess those exact documents, which alone can give, in a certain and positive manner, the local circumstances and details required to weigh their respective advantages and inconve-

niences. But the Board have already formed the conclusion, that a canal from Pittsburg to Lake Erie is not only practicable, but offers no difficulties from the nature of the soil, and will be amply provided with water for its navigation. As to the materials for its construction, stone and lime must be brought from a distance; but may be conveyed by water, by the Ohio or Lake. Brick of the best quality will be amply supplied on the spot.

We will now give a rapid review of the several routes which the canal might follow, and of the operations to perform on the ground, to determine which of them we should adopt.

First route. It may follow the right bank of the Ohio, from Pittsburg to the mouth of Big Beaver, ascend the valleys of Big Beaver, Shenango, and Pymatuning, and descend to Lake Erie at the mouth of the Ashtabula. The summit level of this route would run to the E of Pymatuning Swamp, and be supplied by a feeder led from French creek through Conneaut Lake. Its northern section would descend from the lowest spot between the sources of the Pymatuning and Ashtabula, following the most favorable ground, to the mouth of that latter stream. When it reaches Ashtabula, surveys must determine whether the canal should follow either bank of the river, or run entirely outside of the valley. In either case, all the facts relative to the establishment of a port at the mouths of the Ashtabula, in Lake Erie, must be determined. A feeder must be led from Conneaut Lake to the summit level.

The southern section of the canal, on this route, would descend, successively, the valleys of Pymatuning, Shenango, and Big Beaver, to the Ohio. Levels on both sides of these valleys must determine which is most favorable. The location of the locks and dimensions of the aqueducts must be fixed, as well as those of the dams to four reservoirs, the streams destined to supply it gauged at the points where they are dammed; and the same labor must be performed on all the other routes which we shall designate.

When this route reaches the falls of Big Beaver, surveys must determine whether the directing line of the canal can be run on a height sufficient to turn round the bluff which lies to the east of its confluence in the Ohio, or even to reach Pittsburg at the close of its descent. But if the bluff opposes too many difficulties, and if it be impossible to quit the valley at a height sufficient to reach Pittsburg by successive descent of levels, instead of a section of canal descending from the Big Beaver falls to Pittsburg, we should run one descending from Pittsburg to the mouth of Big Beaver. For this purpose, running from Pittsburg up the valley of Alleghany river a line of 6 inches ascent per mile, to the first spot where a dam might be thrown across that valley, we would form a reservoir. This line would trace the feeder which should supply the canal from Pittsburg to the mouth of the Big Beaver, and this canal run till it met the other, crossing on the right side of the Big Beaver, to avoid the bluff on its left. This arrangement would increase the total lockage of the canal as much as would be required in the descent from Pittsburg to the mouth of Big Beaver.

Second route. It might follow the same route as the former, from Pittsburg to the forks of the Mahoning and Shenango; ascend the Mahoning to Champion Swamp, where its summit level would be traced; then descend to Lake Erie, either by following the valley of Grand river, or turning to the mouth of the Ashtabula, through the townships of Bloomfield and Austenburg. The summit level of this route would be fed by the waters of the Cuyahoga and Silver creek. Its feeder, from the rapids of Cuyahoga, (two miles and a half N. W. from Judge Harman's, where a dam might be conveniently thrown across to form a reservoir) might run to the head of Silver creek, and follow its valley to Garret's mill dam; thence, from a point five feet above this dam be led through the most favorable ground to the summit level. If this route ended, however, in a level lower than the Champion Swamp, we should lead the feeder from a point higher than the rapids, and conduct it through the most favorable ground. The feeder should have a slope of six inches per mile.

The southern section of the canal on this route should cross the Mahoning, near Warren, and drop its level to receive the waters of that river. A dam should be thrown across the valley at Warren, or above, to form a reservoir for the canal. Descending then the right shore of Mahoning valley to the mouth of the Shenango, means should be brought to feed it also with the waters of Musquito creek.

The northern section, if traced by the valley of Grand river, should be run above its highest floods, but kept as low as possible consistently with this rule, to receive the waters of its tributaries. As the valley is excessively steep at the bend of Austenburg, every care must be taken to avoid its rugged banks without crossing the river too frequently on aqueducts. At the mouth of Grand river, the localities must be examined with attention to determine what can be done to form a good port on Lake Erie at Fairport.

If this section is to be traced, running to the Ashtabula, it must pass successively through the townships of Champion, Bristol, Bloomfield, Leffingwell, Rome, Morgan, Austinburg, and Ashtabula. An experimental line may also be run from the east of Bloomfield Swamp, and another from Rome, through Jefferson, to Ashtabula. Their object will be—1st. To discover the best location for a summit level, which may be fed both by the Cuyahoga and French creek, through Conneaut lake. 2d. To fix the most favorable spot for crossing the ridge which runs from Ashtabula to Wrightsburg, parallel to Lake Erie. To complete our investigations relative to the first of these objects, an experimental line should be run from Conneaut lake to the summit level which we have just mentioned; it should, probably, run by the head of the Shenango, Pymatuning, and Musquito creek.

Third route. It might follow the same course as the former, to the fork of the Mahoning and Shenango, ascend the Shenango to Greenville, then Shenango creek, or Crooked creek, to reach the summit level of Conneaut lake; thence, descend to Lake Erie, directing itself on the mouth of Elk creek. Its summit level would be fed by the waters of French creek and reservoir of Conneaut lake. The sur-

veys should begin at a base mark, six inches above the bottom of the outlet of that lake, at its bridge. The summit level line should run north as far as possible, towards the ridge which divides Conneaut lake from Conneaut creek of the lake, and south to the point, where it will be necessary to drop it. By this level we will measure and calculate the deep cuts which will be required through the ridges which bound north or south the basin of the lake, and judge whether the level of that line should be raised to diminish the depth of these cuts, or lowered, in order that Conneaut lake may be high enough for a reservoir; in short, it will shew relatively to its southern section whether the summit level should be separated from the lake.

Having fixed the summit level line, we should run it as far north as possible toward the valley of Conneaut creek of the lakes, and descend the right shore of that valley, on levels as long as possible, to reach Lake Erie at the mouth of Elk creek. All the localities of this spot must be examined with care, to determine what work will be necessary to form a port in the Lake.

To the south of the summit level, two routes may be tried to descend to Greenville: the one through Shenango creek, and the other through Crooked creek. From Greenville, the canal will descend Shenango Creek to the mouth of the Pymatuning, from whence it follows the same route as the first which we have analyzed. At this spot bench marks should be established to compare the levels of these two routes.

A feeder, with a slope of six inches per mile, should be traced from Conneaut lake to French creek, following the left shore of Conneaut creek and the right shore of French creek, directing itself towards Meadville. The surface of Conneaut lake, at its usual level, should be measured, and, in the supposition that its bed should be raised three, six, or nine feet higher, the level of the surrounding ground should be taken on each of these hypothesis, in order to calculate the height, length, and dimensions of the dams, which would be required, in order to confine this reservoir within the bounds, which would be necessary. The elevation of the dam required to keep the waters of French creek at the elevation of the summit level, and its location below Conneaut creek, or below Little Sugar creek, will then be fixed. If this elevation below Sugar creek was moderate, it would procure on the summit level an open passage, through which the trade of Big Sugar creek and the Alleghany above Franklin might pass to the canal, and form, moreover, a vast reservoir to supply all its wants.

Lastly, we should examine whether a branch might not be run from the northern extremity of the canal to Erie, (Presqu' isle) either by following the banks of the Lake, or crossing Elk creek and Walnut creek.

Fourth route. From Pittsburg, it might ascend the valley of the Alleghany to Franklin, and then ascend French creek and Conneaut creek to the summit level of the abovementioned route, following the same directions in its subsequent position.

The summit level and northern section of this route would be the same as those of the former. Its southern section, after descending

the valley of French creek to Franklin, would follow that of the Alleghany to Pittsburg. The two shores of both these valleys are equally favorable for digging a canal, but, as their chief tributaries join them on the left shore, it should be preferred. On each shore there are about ten miles of rugged banks, which leave little or no room for a canal; it will be necessary, at the most difficult spots, either to run it on artificial embankments, or, in the most rugged spots; to pass over from these banks to the other on aqueducts; three miles along the left shore, and four and a half along the other, present the greatest difficulties.

It will be necessary to trace a route along each bank, above the highest floods of the river, to compare them. The Big Sugar creek, the Alleghany above Franklin, Toby's creek and the Kiskimanitas, may be formed into reservoirs to feed the canal, and these may be considered as the lowest levels of canals descending through their valleys. The feeder from these streams should be traced in the preparatory surveys, and the dams which would be required across the valley of the Alleghany should have locks, in order to leave the navigation of that river open. In these surveys, we should take in all the experimental lines for tracing the course of the canal, and those relative to its details, locks, dams, and aqueducts. The waters should every where be measured with care at their lowest stage.

The branches which this canal might receive from the East, give it in our opinion an importance, which, though its route is longer than the other which we have analysed, justifies the expense of a preparatory survey. The whole valley of the Alleghany above Franklin and those of Toby's creek, Mahoning, Kiskiminatas, by which the basin of the Susquehannah may one day be united with that of the Ohio, will thus become tributary to it.

Such are the four routes which may connect the Ohio from Pittsburgh, by the shortest distance and least elevation of summit level with Lake Erie. They may all be regarded as a prolongation of the Chesapeake and Ohio canal, and as forming part of that noble line of artificial communication, which will join the vast regions of our northern Lakes with the Capital of the Republic.

Exact surveys can alone give the true length of these several routes, and the accurate height of their summit levels; the following sketch may, however, give an approximative result to compare them.

1st Route—length, 104 miles; elevation of the summit level at Lake Erie,	450 ft.	total lockage	773 ft.
2d Route, by Grand River—length, 115 miles: height of the summit level above Lake Erie, - - -	342 ft.	do.	557 ft.
by Ashtabula—length, 104 miles; height of the summit level above Lake Erie, - - -	do.	do.	do.
3d. Route—length, 113 miles; height of the summit level above Lake Erie,	470 ft.	do.	803
4th Route—length, 140 miles; height of the summit level above Lake Erie.	470 ft.	total lockage,	749 ft.

And in case a section of canal should descend from Pittsburgh to the north of Big Beaver on the first, second, and third routes we should add about 64 feet to their lockage.

Before concluding this part of our report, we should give some details on other terminations proposed for the Ohio and Erie canal in Lake Erie. One is to the west, and the other to the east of those which we have analysed.

The first joins the Lake at Cleveland. For this purpose, after reaching a proper height to the north of Warren, the route ascends from Garret's mill up Silver creek, and from thence directs itself to the rapids of Cuyahoga. From thence it descends from N. E. to S. W. the valley of Cuyahoga, and directs itself N. N. W. thro' the same valley to Cleaveland. But besides the difficulties which it would meet in winding along this rugged valley and its rapids to Cleveland, the total route of the canal would thus be lengthened from 24 to 50 miles, beyond what would be required if it ended at Ashtabula: and, as the rapids of Cuyahoga are from 97 to 100 feet higher than the Champion swamp, this section would require 194 or 200 feet more of lockage than the former, without the resource of more water at its summit level.

Another direction has been suggested for this route, by embracing the northern section of the Ohio, and Erie Canal, with the canal contemplated by the state of Ohio, to unite the Cuyahoga, and the basin of the Muskingum. The summit level of this route would be in the swamps of the southern line of Portage county, which afford the least elevated, passing between the valley of Cuyahoga, and the southern branch of Mahoning Creek. It is in township No. 1. X range. These swamps, from Mr. Benjamin Tappan, are 553 feet higher than Lake Erie, and 41 feet higher than the rapids of Cuyahoga.

To fulfil this object, the line of the Ohio and Erie canal should, from Warren, be directed through one of the southern branches of the Mahoning creek, to the swamps in Portage county, considered as a summit level. This, however, cannot be supplied, except from the upper Cuyahoga, whence a feeder of 35 to 40 miles in length, and requiring much extra embankments, should be traced from a point, elevated 41 feet at least above the rapids.

By this direction, the northern section of the Ohio and Erie canal would be no more lengthened than in the preceding supposition, when its summit level was at the rapids; but its summit level would be 41 feet higher, and its lockage from 276 to 282 more than by the Champion swamp route. And its feeder being obliged to ascend 41 feet higher than the rapids, it is unlikely that the Cuyahoga, at such a level, would give water enough to feed the canal, on one side to Warren, and on the other to the valley of Cuyahoga, below the falls, and also to supply the lockage on the summit level.

A third direction has been suggested, with a summit level at the rapids of Cuyahoga, from thence, the line would follow the right side of the valley of Cuyahoga, to a point 5 or 6 miles below, from whence it would turn to Cleveland, leaving to its west the ravine of

Tinker's creek. The practicability of this route, and its length, depend on the form and height of the soil between the Cuyahoga, below the rapids, and the head of Tinker's creek. But whatever they may be, the length of this line would be at least as great as that of the Champion Swamp route, and it would require from 194 to 200 feet more of lockage. The only advantage of terminating the canal at Cleveland, rather than any more eastern point, would be, that its port is sooner freed from ice at the close of winter. But admitting it opened a whole month before Buffalo, and ten days before Erie, there could only be a few days difference, between the opening of Cleveland and Fairport, or the mouths of the Ashtabula, or Elk creek. The Board is of opinion, that this advantage would not compensate for the augmentation of length and lockage which it would require, and did not in consequence deem it necessary to reconnoitre those sections which led the canal to terminate at Cleveland.

As to the direction by which it would terminate in Lake Erie to the east of the four routes mentioned above, it begins at Franklin, on the Alleghany river, and ends at Port Erie. This section was explored and levelled by Gen. Marks, Col. Foster, and Col Brown, Pennsylvania Canal Commissioners. From Franklin to Meadville, it follows the eastern side of the Alleghany valley, and ascends it to Lebœuf creek; it then follows Lebœuf creek valley to the Beaver dam swamp, where rise Lebœuf creek and Walnut creek, a tributary of Lake Erie, and which forms its summit level. From Beaver dam swamp it descends to Port Erie. The distance from Franklin to Port Erie by this section of the canal, is 73 miles, of which 15 run from Beaver dam swamp to Erie. The summit level is 630 feet above Lake Erie, and would be fed by the waters of French creek, drawn from Fork point, 21 feet higher than that level. French creek, on the 23d August, 1824, gave, at this place, 43 feet 30 per second: Lebœuf creek at Waterford, 64 feet 9 inches below the Beaver dam swamp; and at its mouth in French creek, 92 feet 9 inches below it. French creek at Franklin, is feet below the same level.

If we adopted this course, in continuation of the fourth route mentioned above, it would augment its length, and as Beaver dam swamp is 160 feet higher than Conneaut Lake, its total lockage would be increased 320 feet. If to this we add, that the summit level of Beaver dam swamp, would be fed by 48 cubic feet per second, whilst Conneaut Lake, in its level, could receive 221, we may conclude to reject this route for the continuation of Ohio and Erie Canal, and prefer the route by Conneaut Lake, which has equally been indicated for the canal, by Messrs. the Pennsylvania Canal Commissioners.

OHIO AND SCHUYLKILL CANAL.

(See Map No. 18.)

It is proposed to run this communication from the valley of Alleghany river above Pittsburg, through those of the Kiskimanitas, Great

and Little Connemaugh, to the west of the ridge, and Juniatti and Susquehannah to its east, to a point above Harrisburg, and from thence to Philadelphia, through the county of Lancaster.

The Board has examined this route in co operation with Messrs. Col. Jacob Holgate, James Clarke, and Charles Tresingburg, Pennsylvania Canal Commissioners. It would unite the Western waters with the Atlantic. The Board began by reconnitering the general features of the country through which it would pass; and the Commissioners then executed, as far as the advanced season would allow it, the levels and surveys required to ascertain the total heights of lockage and the length of its several sections.

From Pittsburg to the mouth of the Kiskimanitas, the valley of the Alleghany offers no difficulties in the way of a canal; the river has from 9 inches to 1 foot of water at its lowest stage, and rises from 20 to 22 feet in its greatest floods at Freeport.

From the mouth of the Kiskimanitas to the forks of the Loyalhanna and Connemaugh, the river presents the same depth as the Alleghany at its lowest stage, but its greatest floods do not rise above 16 or 18 feet.

The banks of the valley offer a succession of flats and bluffs; the first affording a most favorable ground for the canal, and the latter sloping so gently as to oppose no serious obstacles to it.

The Connemaugh to Blairsville, where it is joined on its right shore, by Blacklick creek, offers precisely the same features as the Kiskimanitas, of which it is only a continuation. In descending from Johnstown to Blairsville, it flows with a more rapid course than below Blairsville, and forces its passage successively through Laurel Hill and the Chesnut ridge. The banks of these gaps offer no serious obstacles to a canal.

The gap of Laurel Hill is about 23 miles in length, its right bank is rugged and perpendicular, but the left has a slope of 20 or 30 degrees. Some rapids are found above the gap, but on its whole length the water is deep and the current slow. The gap in Chesnut ridge is about 2 miles long, and is very narrow in some places; it offers two or three rapids, of which the most considerable is Richards' falls; its banks do not slope beyond them 30 or 35 degrees. The floods of the Connemaugh at Laurel Hill gap, rise to 7 or 8 feet. Stony creek and the Little Connemaugh join at Johnstown, and may be considered as the upper forks of the Connemaugh; the canal should proceed up the valley of the Little Connemaugh, to the point where it receives Bear Rock run. Its valley in all that space offering no serious obstacle to it. From Pittsburg to this point, the bottom of all these valleys is stony, and offers a firm and easy ground for the works which may be run through them. Their banks are formed of sandstone, stratified, or in heavy blocks. Coal is abundant; and salt wells have been bored with success through the whole valley of the Connemaugh. These salt works are now in operation, and their number is multiplying very fast at the present moment.

This section from Pittsburg to the forks of the Little Connemaugh and Bear rock Run, may be considered as the western section of the

contemplated canal. It will be supplied with water by the rivers whose valleys it ascends and their tributaries. The results of the measurements which were taken in this view in the middle of September, 1824, are as follows:

The Little Connemaugh below Bear Rock Run, two miles below Selby's mill, yielded,	- - - - -	14.43 ft. per sec.
The Little Connemaugh at Selby's mill,	- - -	7.09
Do. at the mouth of South fork,	- - -	47.21
Do. above Johnstown,	- - -	110.73
Stoney creek above Johnstown,	- - -	239.25

Reservoirs might also be found in the valley above Selby's mill, and the head waters of South fork and Mountain Run led to that spot by feeders.

At this point of the Little Connemaugh the line of canal is stopped by the Alleghany mountain, which it must cross by a tunnel, to join the water courses which fall to the east. The Beaver dam, a branch of the Juniatta, offers the best route. This branch is joined by Burgoon's Creek and Blair's Run; whose springs are constant, and whose waters might be led by feeders to the point where the tunnel opens on the eastern side of the Alleghany mountain; the waters which on both side of that chain might be led to that tunnel and supply the summit level of this canal, can give altogether by actual measurements, 40 cubic feet in a second.

The eastern section of the canal should descend the Beaver Dam, and then follow successively the Frankstown branch of the Juniatta, and the Juniatta itself, to its mouth in the Susquehannah, above Petersburg; from thence it should descend along the Susquehannah to Middletown, to direct itself afterwards, through the most favorable ground, either to the Schuylkill above Philadelphia, or to Philadelphia itself.

The Beaver Dam joins the Frankstown branch at Frankstown; its valley, from Blair's Run, is open and bordered by a large flat bottom. From Frankstown to Williamsburg, the valley offers no serious obstacle; the route then traverses Lock Mountain at Canoe Gap. From Williamsburg to Alexandria, the right shore of the river is rugged, but the left easy. The river breaks through Tussey's Mountain. At this Gap its banks are alternately flat and rugged; the flats of one side lying opposite to the bluffs of the other. Its flood seldom rises above seven or eight feet.

From Alexandria to Millerstown, the valley still offers no serious obstacle to a canal. Its banks consist of a succession of flats and bluffs, whose slope is, in general, so gentle towards the river, as to oppose no difficulties in the way of the works. In this space the Juniatta receives the Raystown branch below Huntingdon and Standing Stone Creek, which, at all seasons, affords an ample supply of water. From Blair's Run to Millerstown, the left shore of this valley is, in general, most favorable; but lower down, and to its confluence in the Susquehannah, this shore of the Juniatta offers several perpendicular

bluffs on the river. Seven or eight miles above Clark's Ferry, its bed begins to be crossed by banks of slaty and schistose rock, which obstruct its course. At the Great Falls, three miles above Clark's Ferry, these obstructions rise from four to fifteen feet above the bottom of the stream. The bed of the Susquehanna to Harrisburg, is embarrassed by these schistose banks, which cross it, and belong to the ridge of Peter's mountain, through which the river forces its passage.

All the valleys which we have just mentioned, have a strong solid bottom, favorable for works of this nature; the floods of their rivers do not rise so high as in those which fall from the western side of the Alleghany, but they flow all the year, and are never dried up in the warmest seasons.

From Harrisburg, the route of the canal might proceed to Middletown, at the mouth of the Swatara. But from thence to the Chesapeake, the banks of the Susquehanna become difficult and rugged; this consideration has led to such a passage to the Atlantic, towards the east by the Schuylkill.

To promise a sufficient supply of water for this section, and shorten its distance, it is necessary to keep as much as possible to the south of the road from Middletown to Philadelphia, by Lancaster and Downingtown; thus the line of the canal will intersect the chief tributaries of the Susquehanna below Middletown, and those of the Delaware below Philadelphia; nevertheless, as it crosses them near their heads, it is doubtful whether in the dry season they will supply water enough for an active navigation, especially if we consider that they run over a stratum of calcareous soil, which will frequently occasion considerable filtration. Particular attention should be paid, in tracing this section, to measure the springs which must feed it, and its line must be kept as low as possible to admit as many streams as the localities will allow. In any case, one tunnel will be indispensable at Gap Tavern, through the Mine ridge, which divides Octorara creek from Peguea creek: for the lowest depression of this ridge is 587 feet above the ocean, and 290 above the Susquehanna at Harrisburg.

This gap will thus be the summit level of the section of canal from Harrisburg, to the Schuylkill, and its tunnel must be kept low enough to receive a sufficient supply of water to allow the level which descends on the one side, to Middletown, and on the other to the Schuylkill, to receive also their supplies: and to avoid more summit levels in this section of the route, these requisite conditions will compel to open two other tunnels on this route: the one east of the first between the heads of the Octorara and Buck-run, the other west: through the ridge which divides the little Conestago, from the Big Chickisalengo. The total length of the three tunnels which will probably be required on this section will be about 2 miles.

These important facts, relative to this section, results from the levels, performed under the direction of the Pennsylvania Commissioners, after concluding the reconnoitering, tour which we made together. We will now examine the results of the surveys, which the advanced

state of the season allowed them to make on the other section of the canal; beginning by the summit level on the ridge of the Alleghany.

A profile of the Alleghany mountain has been taken, running from Selby's mill; the line of section making an angle of $81^{\circ}45'$ with the meridian. By that means a point was fixed in Blair's Gap Run, a branch of the Beaver-dam, on a level with Selby's Mill. The horizontal distance between them, was found to be 4 miles 698 yards; If a tunnel was run in this direction and on this level, with deep cuts at both extremities and to the depth of 35 feet, it would have nearly 4 miles in length, its bed would be 754 feet below the summit of the mountain, 1831 feet above the ocean, and 1,075 feet above the Ohio at Pittsburg. By raising the level of this tunnel, its length would be diminished, but it would augment the lockage and be supplied with less water. By lowering it, it would have more water and less lockage, but its length would be augmented. Accurate and detailed estimates can alone enable us to compare the expense of a foot of tunnelling with that of a foot of lockage, &c. But for our present object, we will merely state that a tunnel of 4 miles in length is the shortest which in this part of the Alleghany can unite its eastern and western waters; and that, by lowering it 70 feet, which would diminish its lockage 140 feet, and augment its length about 1 mile, it is probable that the summit level might be abundantly supplied by the constant flowing springs of its eastern and western streams, formed into reservoirs. We will add that the summit of the Alleghany is, from the preceding data, 2,585 feet high at the spot where the profile was taken,

As to the other sections of the canal, the surveys and levels gave the following results for the total amount of their lengths and lockage.

From Pittsburg to the western extremity of its summit level, tunnel length, - - - - -	112 miles, ascent 1,075 feet.
Length of summit level tunnel, - - - - -	4 "
From its eastern extremity to Middletown, - - - - -	153 " descent 1,608 "
From Middletown to the Schuylkill, - - - - -	as. & des. 675 "
	379
	3,358

We have not examined the line of canal which might lead from Harrisburg to the mouth of the Susquehannah; it did not enter into the those operations which we performed in co-operation with the Pennsylvania Canal Commissioners. From the levels run, in 1823, for the state of Maryland, by Capt. Hartman Bache, United States' Topographical Engineer, and Lieuts. Eakin, Graham, and Boyce, of the United States' Artillery, and the surveys directed by Mr. Geddes, a canal, descending from York-Haven to Havre-de-Grace, at the mouth of the Susquehannah, would require 272 feet lockage, on $55\frac{1}{2}$ miles in length. If led to Harrisburg, its total length would be 62 miles, and its lockage 297 feet at most, as Harrisburg is 297 feet above tide water. This line would have over that from Middletown to the Schuylkill, the following advantages: 48 miles less in length to reach tide water; about 378 feet less of lockage; a more plentiful supply of water, and the saving of about two miles of tunnelling. But to these

advantages are opposed the difficulties and obstacles which the ground opposes to the construction of a canal in the Valley of the Susquehanna, from Middletown to Havre-de-Grace: surveys, accurate gauging of the waters, and regular estimates, can only afford elements necessary to decide this question.

In any case, overlooking the consideration of expense, in an object so important as that of uniting the waters of the West with the Atlantic, we see that nature, on the route we have just described, has probably given the means or possibility of joining the Ohio to the Ocean. Reservoirs judiciously formed in the heads of the Conemaugh and Juniatta, might secure a sufficient supply of water to the summit level, and a section of the canal, descending the Valley of the Susquehanna, from Middletown to Havre-de-Grace, might be substituted to that which runs from Middletown to the Schuylkill, if the latter was found more expensive, insufficiently supplied with water, and longer. The comparison of these two routes, and the examination of the summit level, at the heads of the Conemaugh, are the parts of this work which require to be studied with the most scrupulous exactness, before coming to any conclusion.

DELAWARE AND RARITAN CANAL.

This interesting route was examined by the Board, in co-operation with Messrs. the Hon. G. Holcombe, L. Z. C. Elmer, and Peter Kean, New Jersey Canal Commissioners. A level was run on the ground, in 1816, by Mr. John Randal, jun., under the direction of Messrs. John Rutherford, John W. Simpson, and G. Holcombe, then Canal Commissioners of New Jersey. This is the line which we reconnoitred.

Commencing above Lambertton, it directs itself, deviating little from straight line, to the Raritan, between New Brunswick and Washington. Its length is about 29 miles. Supposing the canal 8 feet deep, and its bottom $60\frac{9}{100}$ feet above the medium of high and low water in the Raritan, and $58\frac{9}{100}$ feet above the medium of high and low water in the Delaware, its line of water would not deviate much from the actual surface of the soil in the greatest part of its length. In some spots, however, embankments would be necessary to raise it; in others, cutting through the undulations of the ground; but the former would seldom exceed from 1 to 12 feet in length; the others from 5 to 20 in depth, and they will only be required for short distances. Many of them may be avoided in finally locating the route of the canal.

This work will thus run on one level, offering, at each extremity, a series of locks to descend, on one side, into the Raritan, and, on the other, into the Delaware. But, before examining its terminations, we should trace the intermediate route between those extreme points.

Crossing, successively, the Assunpink and Millstone, it descends the

valley of Lawrence brook. From the Assunpick to Millstone river, it crosses the ground which divides the waters of the Raritan from those of the Delaware. Although it is lower than the ground between Millstone river and the head of Lawrence brook, at Longbridge farm, it joins the valley of that brook and descends it, turning round the foot of Sandyhill, and crossing from its right to its left shore, follows it nearly to the spot, where it is crossed by the road from Washington to New Brunswick.

The terminations of this canal were not yet fixed upon at the period of our co-operation with the Commissioners. If it is to be 8 feet deep, and navigable for sea vessels, its eastern termination should join the Raritan, if possible, below the obstructions which, at low water, impede its navigation for ships drawing more than 8 feet: for this purpose it should run eastwardly, and by the most favorable ground, to reach a spot on the right shore of the Raritan, below which it may present, through its whole channel, from eight to nine feet of water at low tide. It will, perhaps, be necessary to depart, in consequence, from the line which we have indicated, south of the head of Lawrence brook, and turn, more eastwardly, towards South river.

As to the termination of the canal in the Delaware, that river is obstructed below Trenton, by shifting banks, which are covered by only $2\frac{1}{2}$ feet at low water. These obstacles extend to Bordentown, and are formed by the deposite of the waters at the meeting of the rising tide and descending course of the Delaware. It is not probable that they can be remedied by any works performed in the bed of the river. This circumstance will compel to descend from the heights of Lambertton into the valley of Conwick's creek, to join the Delaware at Bordentown; and, as this creek presents a bar at its mouth, it will require a dredging machine to keep its channel open. From the point where the canal joins Conwick's creek, to Bordentown, the right side of its valley is perpendicular, and 60 or 70 feet high. Its left shore is a meadow, whose surface is higher than the waters of the Delaware, and is never flooded by the ice which the Delaware drives down in the winter. The canal might be run along this prairie, during this part of its course; and the widening of the creek at its mouth, would afford, in every season, a safe harbor for the boats and vessels navigating the canal. As to the nature of the soil, it consists, generally, of a mixture of light sand and stony gravel, and will compel, not only to give a great slope to the sides of the canal, but to puddle both them and the bottom, in order to diminish its leakage and filtration, especially where the line of the canal will require it to be raised above the natural soil. Independently of the water required for its lockage, on a route so frequented as that between the Delaware and Raritan, this soil will also render a large supply necessary, to provide for losses from filtrations and evaporation.

The heads of the Assunpick, Millstone, and Lawrence brooks, will certainly furnish a great deal, amounting, from the measurement taken in 1816, by Mr. M. J. Randal, jr. to 8,234,444 cubic yards a

month; but it is not stated if they were taken at the lowest stage of those streams. If so, this quantity would be sufficient for a canal 60 feet wide at its upper surface, 30 at bottom, and 8 feet deep, on 30 or 40 miles of length. But, to ascertain, so as to leave no doubt on the subject, the exact quantity which those streams can supply, is an indispensable preliminary operation to decide whether it will not be necessary to have recourse to the waters of the Delaware in order to feed the canal—and supposing it was not found necessary, we should still compare, *on the other side*, the expense of purchasing the mill sites of these rivers, and the loss which their suppression would occasion; and, *on the other side*, the cost of a navigable feeder descending from the Delaware, balanced with the advantages which it would add to the revenue of the canal.

If this feeder began at the rapids of the Delaware, above Tumbling dam, that river might supply the canal with all the water which it required. This spot is 90 feet above the level of the stream at Trenton from Judge Gordon's levels, and 28 or 29 feet above the line of water of the canal; the localities are favorable for the construction of a wing-dam, and the navigable feeder would run for 25 or 30 miles in length, through a ground which would oppose no serious obstacle to its course. Supposing the canal terminated in the valley of Conwick's creek, this feeder might supply a branch, opening a communication between Trenton and the canal. It is needless to add, that, as it would enter the canal at its western extremity, it would be necessary to give to the bottom of that canal a slope from west to east, sufficient to make its waters flow freely at the end opposite to that which receives the feeder.

As to the dimensions of the canal, we have supposed that its depth would be at least 8 feet, and that it should be navigable for bay vessels—otherwise, the noble line of interior navigation running parallel to the coast, and which is contemplated from Georgia to Massachusetts, would here be interrupted. In a national point of view, it is therefore very desirable, that the Delaware and Raritan Canal, which, besides, communicates between two such cities as New York and Philadelphia, should receive the same profile adopted for the Chesapeake and Delaware Canal, by the high spirited gentlemen, engaged now in that great work (1.)

BARNSTABLE AND HYANNIS HARBOR CANAL.

The northern termination of this canal opens in Barnstable harbour, and its southern termination in Hyannis harbour. Its object is to provide a passage through the isthmus of Cape Cod, in order that the coasting trade may avoid doubling that cape.

(1.) This canal will be 60 feet wide at the water's line, 30 at the bottom, 8 feet deep, 14 miles long, and is lined with stone.

The two issues of this canal, are the only favorable points about it; the intermediate ground is entirely unfit for such a work. The harbor of Barnstable is well sheltered; its channel near the entry of the port, is intercepted by a bar, which has, at the ebb of the tide, but five or six feet of water, but, in the interior of the port it offers an excellent anchorage. The tide rises here about ten feet. Hyannis harbor is an open road, with two or three fathoms of water at low tides, but has an anchorage where vessels can be secured against any wind. In winter, it is easily disengaged from ice.

The line of canal which should join these two ports, would be only five or six miles long, but there is no valley in that space to receive it, and it should be one deep cut from one end to the other. The lowest part of the ridge which it should cross, is at sight 80 feet at least above low tides. It is true, that between the hills which form this ridge, lie a chain of ponds in the direction which the canal should follow; which might suggest the idea of uniting them by deep cuts, and making them a part of the canal. But they would not give the water required for its navigation; they appear to be filled by rains and snows rather than by springs, and what confirms this hypothesis, is, that, a cut having been made from one of them, to establish a mill at this artificial outlet, its surface immediately sunk to the level of its bottom, and never rose since. And, as besides, each of them only receives the waters of a small surface of ground, they cannot be considered as reservoirs sufficient for the object in view; the highest of them could never feed a summit level.

From these motives, and from the evident inferiority of this line to a more western one, which we are going to describe, we are of opinion that it ought to be given up.

BUZZARD'S BAY AND BARNSTABLE CANAL,

A canal to communicate between Buzzard's and Barnstable bay, should follow successively from W. to E. the valleys of Monument and Scusset rivers. That route was surveyed in 1818, by Mr. L. Baldwin, at the individual expense of Messrs. Israel Thorndike, Thomas Perkins, and other gentlemen of Boston. Its total length is about eight miles. (See map No. 19.)

At its western extremity, the tide rises in Buzzard's bay, from five feet to five feet three inches. At its eastern extremity, it rises in Barnstable bay, from ten feet, to ten feet four inches, and three hours and a half later than in the other. Thus the medium of tide water in Barnstable bay, is probably about on a level with high tide water in Buzzard's bay; the level of low water in the latter, was, on the 11th of September, 1818, $8\frac{6}{7}$ inches higher than in Barnstable bay.

As the tide ascends three or four miles in Monument river, and about two miles in Scusset river, this route extends only two or three miles from the head of one tide to the head of the other. The highest

point of the intervening ground is $33\frac{1}{2}$ feet above low water in Barnstable bay, and $23\frac{1}{2}$ above high tide. Thus, nature has left little to do to unite the two bays. We shall trace, in a general manner, the route which the canal might follow.

Departing from Back river harbor at the mouth of Back river, in Buzzard's bay, it might run through the most favorable ground to Monument river, and enter its valley about $\frac{1}{4}$ of a mile above its mouth. Then following that valley to the mouth of Herring pond brook, it might cross the ground which divides the heads of the Monument from those of the Scusset, to descend the valley of the latter to Swift's mill. From thence, it might either follow the left shore of the Scusset river, and enter Barnstable bay by prolonging, in a northern direction, the foot of a bank which lies to the west of the Salt marshes, through which the Scusset winds, before it falls into the bay. Or it might follow the right shore of the Scusset river and cross the Plymouth neck at its lowest point, and, turning to the east, round it, enter the bay in a N. N. E. direction. This second route would be shortest, but the other would be susceptible of better defence in time of war; be more protected at its south against the N. W. winds, and lead to a part of the bay of a more convenient and adequate depth for shipping.

The ground, through which runs this route, offers, on its surface, a sandy soil, embedding rocks, loose stones, and gravel: it is probable that, in digging it to the depth required for the bottom of the canal, we would meet with no great difficulties, but this point can only be decided with certainty by sinking shafts in it.

As to the harbors where the canal would end in both bays, its western extremities would join Back river harbor. Sea vessels, drawing no more than 8 feet, can enter this port. Crossing, at low tide, between Bird's island and Wing's neck, they might run to the east of this neck into a channel from 20 to 22 feet deep, then, directing themselves upon Back river, they would pass a shoal which offers above 8 feet of water, and as they approach Back river, deepens from 13 to 20 feet. Back river harbor might be easily defended in time of war, by batteries raised in Hog's and Marshner's islands, which are near enough for this purpose, to one another and to the main. At low water, the pass between Hog's island and the main, is 3 fathoms deep; that between Hog's and Marshner's islands is fordable, and that between Marshner's island and the main, has about 8 fathoms in depth. These islands form, with the main, a road exposed to the N. W. winds, as the coast to its west is too low and distant to shelter it. Besides the outer harbor of Back river, an inner harbor might easily be formed in the river itself, in laying out and constructing the works of the canal.

At the eastern extremity of the canal, the harbor of Barnstable bay offers 3 fathoms of water at a short distance from the shore. The bank to its west, of which we have spoken above, shields it from N. W. winds, but it remains much exposed to those from north to east round by the west: for the isthmus of Cape Cod is too low and

distant to shelter it. A jetee would be required to fulfil this object, and the materials to erect it, would be found on the shore itself. An inner harbor could easily be dug in the salt marshes through which the canal runs before its termination.

We have only now to determine whether this canal should be built with a summit and inferior levels, or be all constructed on one level, and fed by the tide.

The only stream which could feed its summit level, would be the outlet of Herring pond, 52 feet above high tide in Buzzard's bay. It yielded, on the 30th of October, 1824, $9\frac{1}{2}$ cubic feet per second, and it had rained during the preceding days. This quantity would not suffice even for one half of the minimum of its lockage if the locks admit sea vessels. Of course we have no choice. The canal must extend on one level from one bay to the other, be fed by the tide of Barnstable bay, and provided with a tide-lock and port at each of its extremities. Its bottom will be at least $8\frac{1}{2}$ feet below the neap tides or $9\frac{1}{2}$ below the common tides in this bay. It is needless to add, that its dimensions should be adapted to sea vessels.

This short analysis proves that the practicability of the Buzzard's bay and Barnstable canal does not admit of a doubt, and that its construction will meet with no serious obstacle. The expense will not be great, if we compare it with that of the Delaware and Chesapeake canal, which extends fourteen miles in length, and requires a deep cut of three miles, through a ridge which rises 84 feet above tide water, and 76 feet above its summit level. The maximum cost of this last canal has been valued at \$1,354,364.

The Board have not examined the navigable character of Buzzard's bay, as the season was too advanced to perform this task in a satisfactory manner. The following information has, however, been procured with respect to it.

The Northwest winds, which reign chiefly during the winter and autumn, are favorable to ascend the bay, as well as the Southwest winds, which reign chiefly during the summer. Its shores offer several anchorages; and the rocks which are found amongst them, may be marked, in order that the coasters may avoid them. They may pilot themselves into the bay. It is not affected by fogs more than the Vineyard sound. In its lower parts the tide rises $2\frac{1}{2}$ knots in an hour—on the shoals, 4 knots. In the winter, the ice formed on the northern shore, when thawed by the southwest winds, is driven to the opposite shore, when the northwest blows. In consequence, this bay is therefore longer obstructed by floating ice than the Vineyard sound.

As to the canal itself, it would freeze during $2\frac{1}{2}$ months, at most, and six weeks, at least; but this inconvenience is in some measure diminished, as the port of Boston is frequently inaccessible during two or three weeks in the winter from the same cause.

Buzzard's and Barnstable canal is the eastern link of the great line of internal communication along our Atlantic frontier, which is destined to connect all its ports from Georgia to Massachusetts.

But it cannot be denied, that, in time of war, the passage from Long Island Sound to Buzzard's Bay, is much exposed to be annoyed, or even totally intercepted, by cruisers stationed in the anchorage of Gardiner's Bay. This section of our maritime frontier will thus require, at such a period, a constant naval force for its protection. A naval force will also be required in Barnstable Bay, to secure the communication between the mouth of the canal and Boston Bay.



TAUNTON AND WEYMOUTH CANAL.

This canal will open to the south in Mt. Hope Bay, a branch of Narragansett Bay; and to the north in Boston Bay. Beginning at Weymouth landing, its route would meet the Taunton at Williams' landing place, passing through the township of Abington, Bridgewater, and Raynham. Its total length will be 26 miles, and its summit ground, at Howard's meadow, in Bridgewater town, is 132 feet 10 inches above the highest tides.

This route was explored and surveyed by a committee appointed in March, 1806, by a resolution of the Legislature of Massachusetts, consisting of Messrs. Williams, Taylor, and Eliphilet. The Board received also, on the ground itself, exact documents on the contemplated canal, from Mr. Minot Thayer.

Weymouth Great pond, in Weymouth town, and Cranberry pond, (in Braintree) are considered as reservoirs, destined to feed the summit level of this canal. Weymouth Great pond has an area of $507\frac{1}{16}$ acres; its depth varies from 10 to 18 feet; its surface is 147 feet 5 inches above high tides, and 14 feet 7 inches above the summit level. Cranberry pond is 160 feet 9 inches above tide water, 27 feet 11 inches above the summit level, and 13 feet 4 inches above Weymouth Great pond.

The outlet of the former gave, on the 5th of November, 1824, $2\frac{2}{3}$ cubic feet per second, and Cranberry pond gave $1\frac{1}{2}$ feet—total $3\frac{1}{6}$ cubic feet per second. These two ponds cannot, between them, feed a summit level. Of course, its line of water cannot be raised to the level of the lowest, and it will be necessary to drop it sufficiently to receive some other supplies of water.

Braintree town offers two other ponds on a lower level. They are called Great and Little pond. The former has an area of about 500 acres; its surface is 109 feet 5 inches above tide water, and thus, 23 feet 5 inches below the summit ground. It gave, on the 1st of November, $25\frac{1}{3}$ cubic feet. This quantity, added to $3\frac{1}{6}$ cubic feet, would amount to $29\frac{1}{6}$ cubic feet, and prove barely sufficient for the expense of lockage, which a canal of ordinary dimensions would require, leaving no supply to repair its losses from filtration and evaporation. In the winter, the water of the ponds might indeed be preserved and accumulated by dams, and provide a supply for the open-

ing of navigation. But further investigation can alone decide to what height they might be raised above their actual level, and thus ascertain whether the canal is practicable. The importance of such a work, and particularly of this route, deserves the expense of such researches.

Another pond lies partly in Bridgewater, partly in Raynham town; it is the largest of all those which are found in this route. Its area is valued at about 1000 acres, and its surface is 49 feet 1 inch above tide water. It is thus, 83 feet 9 inches below the summit ground. To drop the level of the line of water on this summit, to a level with the pond, a deep cut of 7 or 8 miles would perhaps be required. Elias pond, as well as those of Furnace and Forge, cannot, therefore, supply the summit level, but may be made use of for feeding the lower levels of the canal.

The depth is 12 feet at Weymouth landing, in high tides, and 4 feet in low tides; the canal should open at a sufficient distance below this place, to reach a depth, which, at low water, may equal its own. By sea, the distance between Weymouth and Boston, is only 12 miles. As to its termination in the Taunton, that river is navigable at high water to one mile above Taunton; but at low water it ceases to be navigable 6 miles below the town. At Taunton the tide rises 3 feet, and the river has there from 6 to 7 feet in depth. The termination of the canal must be directed in consequence, and a tide lock provided at each of its extremities.

As in following this route, the streams which we meet have all a general direction to the east; another route more to the eastward has been surveyed and levelled by commissioners above mentioned. It begins at Weymouth back landing, and directs itself on Titicut bridge, on the principal branch of the Taunton. Its length would be only $23\frac{1}{4}$ miles to the spot where it would begin, to descend the valley of the Taunton. Its summit ground at Curtis' meadow is 131 feet 10 inches above tide water. Weymouth Great pond and Cranberry pond might supply this summit level with their waters; the former is only $3\frac{1}{2}$ miles distant from it. These other ponds might also feed the canal along this route: Whitman's pond, in Weymouth town, three-fourths of a mile from Back river landing; its surface is 54 feet 10 inches above tide water. Barret's mill pond, to the north of the summit ground; its surface is ninety feet two inches above tide water.—Nark's mill pond, to the north of the summit ground; its surface is eighty-two feet five inches above tide water. By a deep cut of forty-nine feet five inches, independent of the inclination of the feeders, and depth of the canal, all these ponds, except Whitman's pond, might convey their waters to the summit level. We should add that in Middleborough, there are three ponds which communicate together, and whose waters may be led to the north in the chief branch of the Taunton; these are Assumset, Long Pond, and Kinticuts.

Exact surveys can alone decide which of these routes affords the most favorable ground; but as to the practicability of either, it rests entirely on the sufficiency of their supply of water, and on the elevation which might be given to them, so as not to require too consideraable

deep cut. The exact gauging of the waters, supplied by several ponds at their lowest stage, a survey of their area, and an investigation into the causes which form and feed them, can alone direct us to come to an accurate conclusion on the practicability of the canal.

If this communication is found practicable, it will procure great advantages. It will shorten by two or three days, the navigation from New York to Boston; and, when the N. W. winds are reigning, will give a great advantage to vessels which may run into Narragansett Bay, rather than Buzzard's Bay: for, on issuing from the eastern termination of the canal projected from the latter Bay to Barnstable Harbor, they could not reach Boston by a N. W. wind. In winter Narragansett Bay does not offer the same difficulties from floating ice as Buzzard's Bay, and its navigation is shorter and safer. In time of war, vessels will be better protected upon this route, and the canal itself better covered against any attack. If, to these considerations, we add the great advantage of a prompt and easy communication between two such harbors as Boston and Narragansett Bay, and of securing, in time of war, the safe and prompt arrival of naval supplies from the southern states to the naval depot of Boston; we will readily conclude that a work so important and useful as the canal from Taunton to Weymouth, deserves that every care and attention should be bestowed in investigating to what degree it is practicable.

Such are the general views and particular details, already ascertained, on the several lines of canals which the Board have explored and examined during the last season. These details may, perhaps, be found, on many points, too minute; but we have deemed them all essential to the object to which they relate. The result of such researches, whether they prove important or otherwise, should, besides, be recorded, to avoid, hereafter, a repetition of the expense which the nation has incurred to procure them.

As to the general results obtained by this expedition, they are as favorable as possible to the great object in contemplation; opening a system of communication to unite all the sections of the Republic by the bonds of commercial intercourse, and rapid mutual aid in time of danger. This system will contribute essentially to the great end of rendering the means of our Government more efficient; for, by reducing the time necessary for communication, it will reduce, in fact, the great distances which divide the sections of our vast empire from each other, and will enable us easily and promptly to transfer the means and produce of one climate to another; it will give a new value to the agricultural and mineral riches of our soil, and a new life and activity to our manufacturing industry, by facilitating their circulation. Without a free and constant circulation, the political, as well as the human body becomes paralyzed and benumbed in its operations.

The results, at the present stage of the operations, are as follow:

1st. A canal from the Potomac to the Ohio, and one from the Ohio to Lake Erie, are perfectly practicable; the difficulties to be encountered in their executions, are, in no respect, greater than those which have been overcome before now in works of the same nature.

2d. A continued line of interior navigation from Chesapeake Bay to Barnstable Bay, Mass. may be opened or rather completed at a reasonable expense for coasting vessels. One branch of it, the Delaware and Chesapeake Canal, is now constructing. The Delaware and Raritan Canal may, at a moderate expense, be built on the same dimensions, (for coasting vessels.) The Buzzard's Bay and Barnstable Canal, at no great expense, may receive a still greater depth of water than the former.

3d. A canal joining Narragansett Bay and Boston Bay, would make a part of this line, and procure great advantages to the interior trade and national defence of the Union, if subsequent surveys demonstrate its practicability. But the canal across the isthmus of Cape Cod, from Hyannis Harbor to Barnstable Bay, from the great expense which its construction would require to procure a sufficiency of water to feed it, is impracticable; and its vicinity to the proposed canal between Barnstable Bay and Buzzard's Bay, renders it an object of less importance.

4th. Lastly, it is probable that a communication may be opened between the Ocean and Ohio, through the Conemaugh and Juniatta.

We should not conclude this report without paying to the gentlemen who have assisted the Board during their labors, the just tribute which we owe to their zeal and talents. Captain Poussin, of the United States' topographical engineers, has continued those efficient and scientific services which rendered him so useful as an assistant in the planning of our system of fortifications for the defence of our frontiers. In this circumstance he has shown himself equally fitted for military and civil engineering.

Lieuts. Courtnay and Dutton, of the military engineer corps, and distinguished pupils of our Military Academy, have shown, by their acquirements, how highly beneficial that institution will become to diffuse through our country that theory of mathematics so useful in civil engineering.

Mr. Wm. Howard, United States' assistant civil engineer, has reconnoitered, along with the Board, the line of the canal from the Potomac to Lake Erie. His advice and services were highly important, and principally in the investigation relative to the summit level of the Ohio and Chesapeake Canal: conversant with every branch of science, he was of great help in our operations.

Major Douglass, Professor of Engineering at the Military Academy, West Point, attended the operations of the Board, whilst they were reconnoitring the route of the Ohio and Erie Canal.

S. BERNARD, *Brig. Gen.*
JOS. G. TOTTEN, *Maj. Eng.*
Brevet Lt. Col.

Washington City, February 2. 1825.



B.

ILLUSTRATION

OF THE

Report of the Board of Internal Improvement.

By J. L. SULLIVAN, *Member, &c. &c.*

On the reconnaissance from the Potomac to the Ohio.

On the reconnaissance from the Ohio to Lake Erie.

On the co-operative reconnaissance through Pennsylvania.

Analysis of the reconnaissance in Massachusetts.

The reconnaissance in Massachusetts.

Washington. February 3, 1825.

Analysis of the First Part.

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- Preliminary remarks.
 - Division of sections.
 - Potomac section.
 - Summit section.
 - Mountain ground, objects of surveys.
 - Valley of the Youghiogeny described.
 - Monongahela, Cheat Run, Sandy Creek.
 - Intermediate route.
 - Results of lines of level.
 - Measurement of water.
 - Comparison of lines and tunnels.
 - Expense of water.
 - Calculations applying experience.
 - Evaporation.
 - Reservoirs.
 - Feeders.
 - Dams.
 - Shortest line considered.
 - Shortest tunnel line considered.
 - A tunnel the gauge of a canal's power.
 - Consideration on the descent from the summit.
 - Reservoirs for the western section.
 - Preferable route, probable.
 - Conclusion and view of general and state canal policy.

Illustration of the report of the Board of Internal Improvement: by J. L. Sullivan.

To Major General ALEXANDER MACOMB,
Chief Engineer, Department of War.

SIR: The Board of Internal Improvement, in their letter, at this time, report on the *practicability* of communications by canal between the tide waters of the Potomac and the head of steam boat navigation on the Ohio; between the Ohio and Lake Erie; between the Ohio and the Schuylkill; between the Delaware and the Rariton; between Buzzard's and Barnstable Bays; and between Narragansett bay and Boston harbor, and intimate their intention to submit their respective views of the means of accomplishing those objects. I have the honor to submit, therefore, the following illustrations of the practicability of these works.

1st. To elucidate and explain the grounds of the opinion which, as a member of the Board, I have expressed, that *it is practicable* to make a canal communication between the tide waters of the Potomac and the Ohio, it will be necessary to have recourse to a few facts founded on the experience of other countries, and in climates most like our own, and to apply the discoveries of experimental philosophy in Europe to a scene of operation under somewhat different circumstances, yet, in this incipient stage of the investigation, in a degree hypothetically.

A canal may be primarily practicable in difficult ground, yet not effectual to its object. It may be constructed in the usual manner, without securing the convenience of a continuity of passage. And as a canal fails of its purpose, unless it affords an expeditious, sure, and cheap route, whatever its elevation of ground, or its length of way, the question is not only whether the work can be done, but whether, in operation, it will be such as the country requires for its accommodation. Our country generally, and, in particular, this elevated part of it, demands a style of civil engineering adapted to the climate and the extraordinary roughness of the ground—a bolder method than has heretofore been usual in the more level communications of Europe, where the surrounding ocean, or the melting Alps, afford a more regular supply of water. Indeed, the prevailing character of the American people, remarkable for activity and energy in travel and business, demands correspondent plans in our canal communications. A glance over the whole ground at this time, in anticipation of the period when the whole plan would have naturally come forward in a mature

report on the line of location, together with an estimate of expense, may yet be made, under existing circumstances, without impropriety.

The whole line naturally divides itself into two sections:

The first extends from the tide to the foot of the Alleghany, where the Savage, a branch of the Potomac, breaks through the Great Back Bone, as this mountain is called to distinguish it from another range more west. This section is computed to be 210 miles.

The second section extends from the mouth of Savage to the mouth of Bear creek, a distance, varying according to the line which may be finally adopted, of from 34 to 62 miles.

The third section extends from the mouth of Bear creek to the city of Pittsburg, 326 to 350 miles, according to the line which may be found most suitable.

The canal between the Ohio and the Lake naturally divides into two sections—the southern and northern—the first about 70, the latter about 30 miles.

The most remarkable features of the eastern or first section may be thus briefly described:

The Potomac passes through the Blue Ridge, near Harper's Ferry, at an elevation of about two hundred feet above tide. This height gives a command of the ground eastward, and may enable the engineer to choose the ground most convenient to pass the *whole* of the Great Falls.

Immediately below the junction of the Shenandoah, which is above the Blue Ridge, the river is contracted by the hills, which will confine the works to a narrow compass. Ledges in the stream transverse to its course, appear well situated to support a dam necessary to form a basin, at once to accommodate the village with a good landing, the trade of the Shenandoah with access to the canal, and for the purpose of supplying water to the eastern levels; but no place on this level presents more complicated circumstances, or requires more to be studied.

The valley of the Potomac, as we ascend it to Cumberland, exhibits favorable ground—generally extensive intervals and gentle acclivities, with few exceptions of abrupt hills. A few aqueducts will be required, and above Cumberland they must be frequent; for 28 miles, it will be often a question of expediency and calculation, whether to cross or recross, or rather carry the canal some distance through rock. It is not, however, improbable that a modern improvement in aqueducts will diminish their expense, so as to make that method less objectionable.

The Potomac, in June, was found to deliver 220 cubic feet per second above Savage, and the Savage 76 cubic feet; on the 17th of September, $100\frac{537}{1000}$, and the Savage 35.618. The survey executed as far down as Cumberland, has ascertained the descent to that place to be 327 feet 6 inches, the distance 28 miles.

The *second* or *summit* section follows up the Savage through the Alleghany mountain, and at the distance of five and a half miles, reaches the Crabtree branch, coming in from the southwest. Thus far, although the hills rise high and steep, there are narrow bottoms

along the stream, on one side or the other, wide enough for a canal; but on ascending the Crabtree, whether it be one mile to Middle Fork, or up to Swan's old mill, seven and a half miles, such is the steepness of the shores and the height of the hills, that it is believed the canal must occupy the bed of the stream.

From Swan's mill we ascend the Dividing Ridge or Little Back Bone mountain gradually a mile, when the descent is very gentle to the glades of Deep Creek. These glades the most favorable ground for the summit level of the canal, are enclosed by hills of moderate elevation, and the creek passes westward through Hoop-pole Ridge narrows, when it falls a few feet, passing on the right, *previously*, North Glade--subsequently Meadow mountain Glade, then Cherry hill high glade run, and then Buffaloe valley. Its course then continues westward through wet ground for six miles, to the head of the rapids, which in a mile terminates at the Youghiogeny River, having Bear Point on the left, and Panther Point on the right, which there will be occasion again to mention.

The junction of the creek with the river is at the foot of the Great Falls. Tracing up its course, we reach, at the distance of nine miles, the Little Youghiogeny coming in from the east, having its source in the Dividing Ridge; but the river being traced further southward, is found to divide into the Cherry tree branch, Snowy branch, and Dunkard Lick. Retracing our steps, Pearl Run comes in from the west, in the Great Falls not far above, and opposite to Deep Creek. The river continuing its course northward, passes through Winding Ridge mountain, and, at the distance of fifteen miles, reaches the mouth of Bear Creek, the western end of the second section. Ascending Bear Creek Middle Branch in about a southeastern course, we come over a low ridge of ground to Buffaloe valley, before mentioned, which leads directly, or nearly so, to Deep Creek bridge, two and a half miles below the narrows.

This general view of the topography of the mountain section, explains the occasion and the object of the lines of level, which were run by the brigades attached to the Board for these operations, as well as to make an accurate and skilful delineation of the ground, to enable the government at once to see the relative situation of the places named in the reports.

On making this part of the reconnaissance, it was perceived that if a line up the *Meadow Mountain Valley* should be found practicable and preferable, it would permit of excavation above the usual surface of Deep creek, free from the incumbrance of much water, and, finally, when done, allow of filling the summit level by means of a dam on the creek near the rapids, empounding a large body of water, to convert the summit into a reservoir; arranging the gates of the locks so as to permit of some variation of the surface. The base line thus fixed, a *central* point, to which all distances should refer, was also established at the bridge.

The survey of the eastern section of the summit ground was assigned to Capt. M'Neill's brigade, and the western section to Capt. Shriver's and the civil surveyors of his party.

The instructions from the Board to them were definitively directed to the determination of points of immediate and primary consequence, viz: The comparative elevation of the streams and intermediate grounds. Consequently, the elevation of the dams necessary on the Youghiogeny, to raise the water high enough to be led into the Deep creek summit. By what line it would be preferable to descend towards the west. By what line to pass with most convenience through the Dividing Ridge. The length of tunnel required on each line. The command of water, both in its natural flow, and capable of being held in reserve against the dry season of the year.

While preparations were making for these investigations, the Board continued the reconnoisance of the country throughout the western section.

Following the course of the Youghiogeny it was found to flow always rapidly between bottom lands and high hills, till within eight or ten miles of Ohiopyle falls, when the bottom lands discontinue, and the shores become rocky and steep. We crossed the Laurel mountain, and returning to the river at Connellsville, ascended the ravine to view the places considered by the inhabitants the most rapid and narrow. This mountain passage of the stream was by them computed to be eighteen miles through. Below Laurel mountain the valley exhibits more easy ground; and the river winds its way among extensive meadows and comparatively gentle hills for forty miles to its junction with the Monongahela, whence the ground is favorable along the right bank to Pittsburg,

We next ascended along the fertile shores of the Monongahela to Geneva, where George's creek comes in from the southeast, perhaps the means, one day, of connecting this productive district with the canal.

The immediate object of this part of our reconnoisance was to view the south ravine of Laurel mountain, through which Cheat river flows, and then to ascend the high ground between it and the Youghiogeny, to examine Pine swamp, the source of Pearl Run, which had been conjectured to be low enough to allow of a canal route in this direction, but it was ascertained to be 222 feet above Deep creek. It is, however, found that Pearl Run may be made to flow a large extent of ground in Pine swamp.

Having, in our way, made some observations on the southern part of *Big Sandy Creek*, which joins Cheat river just above the ravine, we directed our course to the inspection of those branches which occupy the space between the Laurel ridge and Youghiogeny river; and so far as the ground was seen, the aspect of the country was not unfavorable. But whether it would be accessible to a line of canal commencing at the Forks of Bear creek, led along the slope of the eastern side of the Youghiogeny 'till opposite Selby Port, crossing the river to gain Coddington's valley, at a sufficient elevation to be carried into the Valley of the northeast branch of Sandy creek, and by the line which may be found preferable, reach the eastern base of the Laurel range, to pass it by a tunnel, and emerge not far from the village of Monroe, in the county of Fayette, is not yet ascertained.

This line is a part of the unexecuted instructions of the Board. Elevated aqueducts and long tunnels, are now of so common occurrence in modern canalling as to be no material obstacle, especially since the application of the steam engine. But lines or routes of canals are compared, not only in point of expense, but of ultimate practical economy, command of water, preservation of the works, accommodation to the inhabitants of the adjacent country, &c. In this instance, however reluctantly a majority of the Board consented to the investigation of this line, from its forbidding aspect, which it is but justice to them to remark; yet the reasons for it appear to me sufficient, when recollecting that on Erie Canal, from Little Falls twelve miles down along the Mohawk, four times as much water is consumed, as the middle section uses per mile per minute; and knowing how difficult it is to make a canal tight, which is sustained along the rough shore of a river high enough to be out of reach of freshets. Nor is it any easy thing to supply from a river having the characteristics of a torrent, by means of dams; and considering too the length of the ravine, there seemed to be reason for a comparison of a line which might possibly result in an escape from any serious difficulty. The boldness of the plan of crossing the Yonghiogeny at the elevation of perhaps one hundred feet, to gain the valley of Sandy Creek, may be readily countenanced by the experience of England in like cases. The writer of these pages stood on the Aqueduct Pontcysylte, over the river Dee, in North Wales, (130 feet high) while building, and a year afterwards saw it in full operation. Its arches and trunk are of cast iron. (*See plate 415, New Edinburg Ency.*) The place of the tunnel in this instance will demand, no doubt, the best judgment. In the want of a preference of this line, the canal would descend from about one-third the western elevation of the Laurel, and regain the valley of the Youghiogeny not far from Connellsville. The distance is computed, from Bear creek to the mountain, 14 miles; and the saving in the length of the western section about twenty miles. And it is presumed the saving of expense will not be inconsiderable.—There are three great points to be kept in view in deciding upon the line of the western section: *directness, management, as well as command of water, cost of the work, and uninterrupted operation.*

While the Board were fulfilling the orders of the Hon. Secretary of War, in examining the country between the Ohio and the Lake, their instructions had been so far executed on the summit ground, as to determine some of the most material points. I return, therefore, to the inquiry depending thereon.

It was found that the Youghiogeny, at a certain ledge above the great falls designated by the Board, is below the base line	74.50 ft.
The fork of the Little Youghiogeny	- - - 57.
The mouth of Snowy creek	- - - 40.69
The fork of Cherry Tree creek	- - - 30.18
Armstrong's, on Little Youghiogeny	- - - 46.
The mouth of Nest Lick run, on the Little Youghiogeny	16.28

A point four miles above Armstrong's, on the Nest Lick, and four-fifths of a mile above this last place, level with Deep Creek.

The measurement of the water was made after three or four weeks of dry weather, and computed according to methods established by the philosophical experiments of Du Berat, confirmed by those of Dr. Robinson, professor of natural philosophy in the University of Edinburgh, detailed and discussed in his work on mechanical philosophy. And the correctness of them was ingeniously tested by a method of mechanical measurement, contrived by Mr. Shriver, and the gentlemen of his brigade, to prove his calculations. It resulted, from the mean of all these operations, that Deep Creek at that period delivered, per second. $5\frac{540}{1000}$ cubic feet; and Buffalo Run, coming in below the bridge, $1.703 = 7.247$; and, corroborative of it, Captain McNeill measured the same in his section, and found 5.402 feet.

All the head waters of the Youghiogheny were, at this period, also measured.

The Little Youghiogheny	was found to discharge	12.036
The Main Youghiogheny	- - - - -	13.126
Cherry Tree fork	- - - - -	4.300
Snowy creek	- - - - -	11.476
	Feet	41.038

The developement of these facts, suggested the expediency of trying a lower line for the summit level, and a survey was directed to be made up the valley of the Little Youghiogheny, to investigate the practicability of a communication with the *Crabtree*. This line of level was run twenty-four feet below Deep creek, and was found to strike the ground seven and a half miles above Armstrong's, near the mouth of Block Run, and that a tunnel of nearly four miles would effect a communication with Crabby's arm, a branch of the *Crabtree*.

The several lines ascertained by the surveys have their peculiar advantages and disadvantages. It is necessary briefly to describe and enumerate them, in order to explain the reasons of preference, and to account for the manner of applying the principles upon which practicability depends.

These lines may be all considered as starting westward from the mouth of *Crabtree Creek*, because, thus far, the successive levels must depend on the same source of supply. From that point down we have the waters of the *Savage*.

Line.		Distance.	Summit.
		m. yds.	m. yds.
1st.	By Savage River, Monroe Run, Meadow Mountain Valley, to Deep Creek bridge,	15.255	5.0833
2d.	By Crabtree, Middle Fork, west branch Meadow Mountain,	15.0035	3.1333
3d.	" North Glade, - - - - -	15.0248	3.0125

4th.	"	East,	-	-	-	15.0436	3.0085
5th.	"	Rock Camp, north fork Deep Creek,	-	-	-	13.1522	4.0000
6th.	"	Savage Lick Run,	-	-	-	15.1315	2.1085
7th.	"	Hink's Arm,	-	-	-	16.0272	1.1116
8th.	"	Dry Arm,	-	-	-	16.0488	1.0916
9th.	"	Dewickman's Arm,	-	-	-	16.0735	1.0683
10th.	"	Wilson's Fork, Little Youghiogheny,	-	-	-	36.0732	4.0300
11th.	"	Crabby's Arm,	-	-	-	36.0894	3.1538

The several lines thus converging to a point excepting the two last, which are, however, brought to a parallel position and equidistant, nearly from their object, *the mouth of Bear Creek*, the continuation of them, in comparison, may be thus pursued:

The 10th and 11th have *two alternatives*. 1st. To cross Deep Creek over the falls by an aqueduct to Panther Point, then turn that point in high rocky excavation, and descend 150 feet to the river shore, near Hoy's Run, and continue down along the Ginsing Bottoms to the ravine of *Winding Ridge*, pass through it five miles, and in about fifteen miles from the point, reach Bear Creek. Or, 2dly, ascend along Deep Creek, cross it at the rapid by an aqueduct, pass through Panther Ridge by a tunnel of half a mile; then, either cross Hoy's Valley by an embankment and aqueduct, or turn it by a circuitous line, and gaining the west branch of Bear, descend to the mouth of the creek, about 24 miles. These distances added to the former, make by one route, $51\frac{1}{2}$ miles.

By the other, $60\frac{1}{4}$ miles.

The Glade lines having converged to the *centre at the bridge*, the comparison may next be made between that which has the *shortest tunnel* and that which has the *least distance*; these are the 2d and the 9th.

The second line has to the centre point the length of, miles 15.0085 yards. If we continue the line up *Buffalo Valley* till the digging becomes 35 feet deep to a tunnel, not exceeding two miles, under a ridge of 170 feet, the distance is, miles 14.0000, which, added to the preceding, is miles 29.0035 yards. Or, if we take the length of the 9th line, with the shortest tunnel, it is 30 miles 732 yards.

This would evidently be the least expensive route, through at a higher level; and the question of supply of water comes next in order.

Canals in England being in a very different climate, do not, in regard to water, afford data on which fully to rely. Our own experience is not conclusive, since the Santee has required to be deepened, and Middlesex was not made originally with that precaution which might have allowed it to be a guide in this estimate, nor has Erie Canal been long enough in operation to exhibit the minimum of its consumption of water by filtration. The canals of France, whose climate most resembles that of the middle states, differ greatly from

each other. But to take the mean of these and the best section of Erie together, is perhaps a near approximation to the truth, viz:

	wide,	deep,	cubic ft.	lockage,	evaporation	filtration.
The canal de Briare, (6 miles,) 40 ft.	4 ft.	sect. 128	uses 62.60	5.80	56.80	
The canal of Languedoc, (69 miles,) 64 ft.	7 $\frac{1}{2}$	sect. 375	" 35.90	17.00	18.90	
The canal du Centre, (69 miles,) 47 ft.	5 $\frac{1}{2}$	sect. 215	" 55.60	9.74	45.86	
The canal of St. Quintin, (32 miles,) 5 $\frac{1}{4}$ ft.	5 $\frac{1}{3}$	sect. 232	" 70.70	10.52	60.58	
The Erie canal (141 miles,) 40 ft.	4	sect. 136	" 121.00	6.16	114.84	
				414	348.78	

The whole expense of water per mile per minute, 69
 The whole expense of water for evaporation and filtration per minute, 58.13

The above is for the *summit* levels, and the estimate of lockage is assumed proportionately for all, from the average of Languedoc, for six years, which was found to be 1920 boats a year. If, therefore, the locks on this canal are 100 feet by 20 feet, and 8 feet deep,

$16,000 \times 1920 =$ _____
 365 is 841,644 cubic feet per day of 12 hours,
 or 1169 cubic feet per minute; which, divided by the number of miles
 69, gives 17 feet per mile per minute; then, assuming that the others
 have *proportionate lockage*, and that these locks are of a size propor-
 tionate to their section, and the above deductions will be in accordance
 with Languedoc, leaving for evaporation and filtration above 58.13 per
 mile per minute.

This average is much more favorable than the experience of Erie canal alone would have been, as it has been stated in the Ohio Commissioners' report, as the answer of one of the Engineers to their inquiry, viz:

'That 61 miles of this canal, Rochester to Senaca, uses 6000 ft.

11	the Camillus level,	-	-	2000 ft.
69	the Rome summit,	-	-	9000 ft.
141				ft. 17000
	Per mile per minute,			120.57

If the preceding calculation of the mean of the expense of water per mile per minute, is a *near* approximation to the truth, the application of it may be made to the lines of canal by considering, not only the summit level, but those levels which are successively, or alike dependent on the same source as one of the data of the estimate, and the *lockage* from the summit level as another.

It is proper to take the longest line, in the first instance, sixty miles; especially as the passage of the Winding Ridge Ravine (not yet surveyed) is considered very difficult: $60 \times 58.13 =$ ft. 3,487,800.

The lockage may, on so great a communication, be nearly equal to the possible operation of the canal; and if we suppose a boat to enter at each end every twelve minutes, or five per hour, and the descending boats passed at the same time, there would be ten falls per hour.

The locks $90 \times 15 \times 8 = 10,800$

Plus $\frac{1}{5}$ th, for waste, $\underline{\underline{=}}$ 2,700

$\underline{\underline{13,500}}$

Per hour. - 135,000

Per minute, - - - - - 2250.00

Per minute, total cubic feet, - - - - - 5737.80

Per second, - - - - - ft. 95.63

The flowing water at command, as before stated, - - - - - 48.28

The requisite artificial supply per second, - - - - - 47.55

The next point in the investigation is, what body of water would afford this supply; what opportunities of forming reservoirs exist; and on what principles both such, and the feeders from them, are constructed?

That they would be filled, may be shewn from the known operations of nature on these high grounds.

The ratio of evaporation is a preliminary and indispensable inquiry. From a very extensive collection of facts, by philosophical observers in Europe, it appears that the ratio of evaporation from the *surface of water*, in the summer season, is greater than the *rain*; but from *land*, somewhat less. To exemplify the first, it is found that, by observations at Salem, in the United States, the rain is 35 inches, the evaporation 56 inches: at Baltimore, (by Mr. Brantz,) 39.83 inches: evaporation not observed in an open field.

In England, the average of six years,	21.00	on the plane.
	25.00	on an eminence.
Idem, another series,	23.83	evaporation 36.44
Idem, in winter months,	11.48	10.27
Idem, in summer,	12.43	26.17
In Scotland, in winter,	14.19	12.89
In summer,	19.36	31.51

The well-known experiments of Dalton and of Hoyle, resulted in shewing the loss to be 1-5th of an inch in 12 hours.

There is a resemblance, in some respects, between the summer weather of England, and of the Allegany, in the temperature, and the frequency of showers.

The rain and evaporation *in summer* belong more especially to our computation. The following results, for the several months of the year, are from long observation in England.

			Inches evaporation from Ground.		Inches from Water.
In January, the rain	2.46	-	1.01	-	1.50
February do	1.80	-	.53	-	2.00
March do	.90	-	.62	-	3.50
April do	1.72	-	1.49	-	4.50
May do	4.18	-	2.69	-	4.96
June do	2.48	-	2.18	-	6.49
July do	4.15	-	4.06	-	5.63
August do	3.55	-	3.38	-	6.06
September do	3.28	-	2.95	-	8.90
October do	2.90	-	2.67	-	2.35
November do	2.93	-	2.08	-	2.04
December do	3.20	-	1.48	-	1.50
	—	—	—	—	—
	33.55		25.14		44.48
	—	—	—	—	—

The six summer months, 19.36 16.78 31.54

The difference, 12.18, or at least one foot more evaporation than rain. But these experiments must necessarily have been tried on a small and great surface; but the surface of a reservoir is exposed to the wind: This exposure to the cause of evaporation is increased by the agitation of the surface of the water in waves, and even by its mechanical force to take up and carry off the broken, air-commingled particles, facilitating the chemical union of the water with air, according to the received theory: of its solution by means of caloric: the one fluid combining with the other through its agency. But against this excessive evaporation by the wind, we may set the reduced temperature of this lofty region. The water being held in the air by means of caloric, the presence of comparatively cooler strata of the air is often evinced in the sudden production of clouds and rain. Moisture, copiously exhaled in the warm latitudes of the Gulf of Mexico, and throughout the vast valleys of the Mississippi, the Ohio, the Cumberland, the Tennessee, the Alabama, is borne by the prevailing winds of spring and summer *in contact* with the Appalachian range, and there meeting with the winds of the north and the east, unite and precipitate those copious and genial showers which supply every river and fertilize every state.

While natural philosophy and experience permit no doubt of the existence of those regular causes of an ample supply of rain in the spring of the year, to fill great reservoirs, we must not omit an interesting experiment in Scotland, which establishes another law, corroborative of those, but applicable to the summer season, to prove that it rains more, even on moderate eminences than on the plains. Two rain gauges were employed, one upon a hill 600 feet above the

sea, the other on the low ground, 20 feet only above the sea. The series of observations extended through the course of five years, 1814 to 1818; when it resulted that there fell, in a year, upon the plain, 25.66, upon the hill, 41.49 inches, nearly as 5 to 8.

The past summer, in the month of June, there was, on the Allegheny, a copious fall of rain, which raised Deep Creek nine feet. But, from the 4th July to 17th August, there was little, and then quite a freshet; but it was again a dry time in September.

We return, therefore, to the extent or capacity of reservoirs requisite to the quantity of water deficient for the longest line, sixty miles:

Deficiency 47.35 cubic feet, $\times 60 \times 60 \times 24 \times 60$ days = 245,462,400 cubic feet.

To provide for this quantity, under the supposition of its being requisite for 60 days, we have the following places, which if flowed to the depth of six feet above the level required for feeders, whose slope shall be sufficient to carry the water to the canal, with an allowance above that of one foot, for evaporation, and two feet for filtration, will contain *available quantities* as follows, according to the report of the surveys, viz.

1st. On the Youghiogeny, above the mouth of Cherry tree branch, by a dam, which, measured from the surface of the stream to the surface of the reservoir, will be, besides the submerged part and the foundation	19 ft. 149,131,000
2d. On Cherry tree Creek,	19 ft. 85,494,000
3d. On the Youghiogany, from Cherry tree to Snowy Creek	29 ft. 75,506,000
4th. On Snowy Creek, including Laurel,	29 ft. 176,490,000
5th. On Youghiogeny, from Snowy Creek dam to Little Youghiogeny,	44 ft. 150,000,000
6th. On the Little Youghiogeny,	44 ft. 200,000,000
Cubic feet,	
<u> </u> 836.721,000	

This quantity appears to be treble that required, nor have we included those reserves which might be formed on the Deep Creek and Glades; nor that of which the Pine Swamp, west of the Youghiogeny, may be capable; nor one which might possibly be formed by a dam 90 feet high, above the Great Falls.

The four first are the most practicable, and they would have a feeder of about 16 miles in length.

It is not to be denied, in practice, that the principles which should govern the construction of *feeders* are in some obscurity: with the utmost precaution they have sometimes disappointed expectation. That of St. Prive, on the canal De Briare, is eleven miles in length, and it lost three fourths of the water that entered it, although the feeder was rebuilt with every possible precaution, *except covering it*. The usual section of the stream at the entrance gate was 5 feet broad and

2 feet deep: the gate where the feeder discharged into the summit level is 3 feet 4, and the water 7 inches deep. The slope of this feeder was $5\frac{1}{2}$ inches per mile. The quantity of water received into the feeders of Languedoc canal, is 72,000,000 metres; of which 37,256,000 is discharged into the canal, and 35,344,000 is lost by filtration and evaporation. Without attempting either to account for this loss, or for the fact that feeders, of comparatively small dimensions, appear to lose as much as canals, the conjecture may be hazarded that the shallowness of the water permits its temperature to be raised—its velocity increases exposure to the air, and the more so if the wind is against the current: the absence of hydrostatic pressure on the banks, as the volume diminishes, allows them to become more dry and absorbent. These concurrent causes may account for the disappearance of this large proportion, and may suggest, besides the expedient of covering them from the sun, others by which they may be adapted to our climate.

The construction of dams of great elevation, though by no means impracticable, are not only attended with expense and difficulty, but with some uncertainty. That of the St. Ferreol reservoir of Languedoc, is 110 feet in height; in masonry, parallel walls of great thickness, filled between with earth. But it is stated, as the result of experience in dams of masonry, that they are found too often to require repairs. In Scotland, preference is given to building a puddle wall in the centre of an embankment. There is one of this kind, 90 feet high, at Glencorriburn, near Edinburg. In building them, the course of the stream must be diverted. Puddle is any tenacious earth, compacted under water, by which the air is excluded from it—the particles of the mass are afterwards kept in contact by the weight of the atmosphere.

The uncertainty of success arises principally from the hydrostatic pressure, in any deep artificial water, which sometimes occasions small leaks secretly to spring out, perhaps through fissures of the rock, if on lime stone; or, by the porosity of the earth, discharging much water by small and imperceptible openings. Reservoirs are, of course, experimental, in proportion to their magnitude; but most likely to succeed where the ground has been occasionally or annually flowed.

We have shown that the loss by evaporation more than rain, may, in summer, be one foot. Du Cros, (a writer on these subjects,) states the absorption on canals to be one and an half times the evaporation. In this ratio, we must allow for a reservoir, were it of the same depth only; according to the tables for the summer season, 31.45 inches, plus 15.77, but as a drought for sixty days would be so extraordinary as to preclude the navigation of the western rivers—we may safely assume the results of Dalton's experiments which were 12 inches for sixty days, and allow the filtration to be 2 feet. This addition has been therefore made on the elevations of the dams.

It has been shown, that, by these means and methods, there may be water enough for the *longest*, but *lowest*, line.

The next inquiry is, whether there is water enough at command for the shortest line, 29 miles, described page 15.

This line is higher than the former by 34 feet, viz: 10 feet above the base line of Deep creek, occasioned by ascending to the Bench mark near the mouth of Meadow Mountain Run, and which increased elevation is necessary to be out of reach of the freshets of Deep creek, which rise at the bridge, at least 9 feet.

As the canal must be kept out of reach of floods, it may be supposed to be led along the foot of Meadow mountain, across Cherry-tree Glade Run, and along the declivity of Negro mountain, and up the Buffaloe valley to the tunnel leading into Bear creek valley, which on this plan may be shortened, and by somewhat deeper digging at both ends, reduced to about one mile.

The quantity required, in. $29 \times 58.13 = 1,685.77$

Lockage as before. - - - 2,250.00

per minute, 3,935.77

per second, 65.59

To supply this demand, we have Deep creek in its lowest state. - 7.247

Quantity to be provided for. feet, $58,343 \times 60 \times 60 \times 24 \times 60$
days, = 309,346,560 cubic feet.

To provide for it we have,

1st. The summit level capable of a variation of three feet. Its length measured from the eastern extremity of the east tunnel to the western extremity of the west tunnel is 10 ms. 1,663 yds. of which 4 ms. 1,333 yds. may be 15 feet wide.

5 ms. 1,100 yds. may be 40 feet wide, 376,785
188,000

feet, 1,564,785
Multiplied by 3, 3

4,692,555

The Glade reservoir may be formed by a dam at the narrows, 200 feet wide, 12 feet high, plus foundation. This would flow the water to Elk Lick, on the foot of the Dividing ridge which is, feet, 26.194 above base and

m. d. p.
4 42 32

Because less to Meadow mountain.

feet 14,844 - distance, 2 13 37

Shows the dam to be 11,750 the distance, 2 28 95

The area would be about $2\frac{1}{2}$ miles plus 1 mile up South fork, plus $\frac{3}{4}$ up North glade or $4 \times \frac{1}{4}$ is 27,878,400, 6 feet deep available. 167,270,400

To this we may add a reservoir higher on the South fork; another higher on the North glade, another on Meadow Mountain Run about the entrance to the tunnel, and on the high glade of Cherrytree; these require no extent of feeders, and a moderate extent and elevation of dam. These may be considered as at least equal to one square mile 6 feet deep, or, 167,270.400, which added to the preceding sums, is 339,233.155.

Recollecting that we are providing for a *drought of sixty days*, which has never been known on these mountains, this may be admitted as sufficient—but, in truth, we have assumed large size locks, and *constant* operation of them. But it may appear inexpedient that they should be so large, and still there are two other sources of supply, attended with some expense. These are—First, To bring into the glade reservoir the waters of the upper branches of the Little Youghiogeny, Nest Lick, and Wolf Runs, (the minimum delivery of which, appears to have been, feet 8.746,) by means of a duct through the intervening hill, the distance through, being three miles, and connected with this, might be a feeder to the Cherrytree fork, which affords 11,503, these added 1,728,000, and reach the best situation for reservoirs on all the upper branches of the Youghiogeny.

To these may be added the Pearl Run and Pine swamp reservoir, which may, (according to Mr. Shriver's Memoir and survey,) be of several square miles extent, confined by a dam of small dimensions. But this must be attained by means of an aqueduct feeder, and the use of some extent of iron pipe. This is not difficult, but the ground has not been examined with this view; the elevation is, however, considerably above the base line, and the line under discussion. But we may leave the resources of the west side of the river in reserve for the western section.

It remains to elucidate the circumstances of the line with the *shortest tunnel*, viz: the 9th line. This line passing from Dry Arm to Deep creek, it is probable the tunnel may be shortened to *one mile*—passing down the glade to the narrows, it thence will follow, as before described, the course to Bear creek valley. The glade was examined and found to have a soil of about four feet deep, based on rock, probably like that of the adjacent ridges sandstone in strata. If excavation were to commence 4 feet deep at North glade, which was found to be 17.794, then minus 4, is 13.794. The mouth of Elk Lick opposite Dry Arm 26.194 above base, also, minus 4 = 22.194 less 13.794 = feet 8.400, the depth of digging in rock diminishing westward to 0. In forming a canal through the glade, it will, no doubt, be necessary to employ considerable force in pumping; perhaps the cheapest power is the steam engine, where fuel is cheap.

The summit level would occupy the place of one of the glade reservoirs before described, and must be made to have the properties of one. The others will be conditionally adequate.

This line is one mile longer than the shortest; but besides that, the tunnel is but about one mile. Should increase of business on the canal render it expedient, a second tunnel of the same length might be made.

not far from the first, into Dewickman's arm; and two, or a *wide one*, will be necessary. The inconvenience of *narrow tunnels* in causing delay, is thus exemplified: If it be one mile through, and boats can pass in half an hour, and are entering half an hour, others wait *an hour* for their turn, which is six hours a day, and which diminishes the power of the canal, considered as a machine, one half. In an active trade the tunnel may as well be the gauge of all the rest of the canal, and a great saving of cost take place. In this country, where so many are doing business on their own account, delay and hindrance ill accords with the industrious, persevering genius of the people: hindrance also occurs where a canal, being led through rock, is made narrow; or where aqueducts are of single width, or the abutments of bridges are allowed to contract the trunk of the canal. It may be said, without hesitation, that a work like this in contemplation of the National Government, should be capable of *two processions of boats*, in opposite directions, from end to end; but the size of them should be adapted to the trade, and to the natural navigation which the canal connects together.

It thus appearing that the communication is practicable by the ordinary methods of supply, the natural flow and reserved bodies of water; the practical inquiry next occurs, whether the descent from the summit level each way, so much in so short a distance, affords room for the locks? From the east end of the tunnel to the mouth of *Crabtree*, will be eight miles, the descent being 1,054 feet; it is 40 in length for one descent. A lock of 100 feet, eight feet lift, with its entrances, occupies 120 feet. Therefore, a succession of locks with intermediate basins of 200 feet, will occupy the whole ground. On the west side the descent is 960 feet in six miles, or 33 feet for one foot. It would indeed be very difficult to keep a canal in operation thus constructed; the reason is, that, in these successive basins, their depth, in relation to the entrances of the locks, is easily deranged. If a boat is going up, she checks the supply, and, at the same time, another draws from the source thus failing of supply: throughout one hundred and five locks, and as many basins, there would be an incessant fluctuation of this kind of trouble. To remedy it by a feeder along the whole way, parallel to the work, would involve the waste of water, did the ground permit; or, if the descent were made by a set of connected locks, four or six together, in order to extend the basins in this case to 1,000 feet, then occurs delay in passing, unless there are *parallel* series; and, for this, I fear our ravine of 40 feet will hardly afford room.

There are indeed other methods of passing from one level of a canal to another; but it too often occurs that ingenuity is disappointed of fortunate results, from a want of that practical philosophy which would have enabled them to calculate the strength of materials, and the resistance of friction in the movement of heavy bodies, and whenever improvements of this kind come from the hands of those who are known to be versed in mechanical science, such is the natural fondness of inventive genius for its own offspring, that machines for a

public object must be subjected to the coolest test of principle, the most thorough investigation, and the judgment of practical minds.

The western section may have an interest, or depend in a degree on the reservoirs or the head branches of the Youghiogeny: we have not only to guard against the violence of floods, but the extreme of the opposite condition; and the utility of them is at once perceived in reviewing the circumstances of the two lines of this part of the route, for which the water must almost all go from the mountains, one hundred miles.

Besides those, there may be one by means of a dam at the head of the ravine of Winding Ridge. From hence, or from some lower point in this passage, a feeder may be led to the canal at the elevation required for the Laurel tunnel route; or if the line should be preferable down the course of the river, then others on Casselman's and North Branches. Indeed, these may, in either case, be wanted, as the two lines unite below the Laurel Mountain, and the supply must then be had from the Youghiogeny.

Finally. Having explained the whole subject, so far as the present state of information permits, my impression is, that, notwithstanding the (9th) line of the shortest tunnel is not the shortest canal, and the Deep Creek summit will be *thirty-four feet higher* than the circuitous line; notwithstanding the route by Bear Creek will require a second tunnel, and the line away from the river a third tunnel, and a magnificent aqueduct, yet I give a decided preference to this whole route, as that which embraces the great points, directness, control and command of water, economy of expense, and continuity of operation, with most certainty. Both lines should be investigated thoroughly, as it is for posterity and perpetuity that this great work is to be accomplished.

In conclusion, a few general remarks may be offered, arising from the occasion and the position of the Board. No difficulty has been diminished or magnified. The obstacle to a communication by the Potomac route with the Western states, lessens to a point, compared with the magnitude of the object, whether in a commercial or political relation to the prosperity of the country. In Europe, their canals, even those of Governments, have all some definite limited object of utility. But here it is not alone the distance—the elevation—the vast natural navigation to be connected, which constitutes the grandeur of the design; but the immense interests it combines into an harmonious national whole.

Whoever visits the Western states for the first time, is astonished that so few years have elapsed, since this fertile and populous part of our country was a vast wilderness; but the surprise ceases with the recollection, that, at the establishment of the constitution, the United States became the owners of these lands, ceded and pledged by the states to each other, jointly and severally, as a basis of public credit, so broad and safe as to be an effectual guarantee against the oppression of an accumulating national debt, and therefore, the real wealth with which every thing for the common good may be accom-

plished. The immediate offer to sale of this fine body of land, in a mild climate, intersected by great and by small rivers, could not but induce the emigration of a youthful, brave, and resolute population, from every Atlantic state.

The provisions of the constitution were thus fulfilled: and in time, young states became partners with their old parents in the advantages of civil liberty. Money paid into the common treasury purchased a title to their farms; but they carried with them, or inherited a title to equal prosperity under that compact, which establishes power to provide for the general welfare.

This prosperity, it is clear, can be attained only when the geographical isolation of a large portion of the country shall cease, and avenues be opened to a participation, on equal terms, in the commerce of the world. From the Alleghany mountain to the Wabash; from the Tennessee to the Lakes, there is a great and valuable portion of the interior remote from every seaport, and intercepted by nearer, but not more fertile regions from the accessible markets, especially in the early spring. Industry is indeed so depressed, that, notwithstanding the modern mode of navigation prevails largely, produce is so low as to bear land carriage (by the National road) three hundred miles.

This section of our country comprehends one sixth of Virginia, one fourth of Pennsylvania, with the states of Ohio, Indiana, and Kentucky, containing eighty-five millions of acres, and at least one million six hundred thousand inhabitants. But not these only—all beyond them are interested in an ultimate system of internal communications, and all, too, on this side, since our internal prosperity is the support of our external commerce—our navigation, which cherishes our best means of preserving peace, by efficiency in war. The eight Western states contain two hundred and forty-eight millions of acres, and at least two million five hundred thousand inhabitants. If the land may average five dollars an acre, its value is twelve hundred and forty millions of dollars, and to this may be superadded, the four territories, containing seven hundred and eighty-six millions of acres, much of which is already likewise valuable. How small a percentage on this value would amount to the cost of all the internal improvements! How certainly good communications must double that value!

That these and other great results in contemplation of government, cannot be produced and secured by any single canal in execution or contemplation by the states which extend beyond the mountains, is demonstrable. Constructed by their citizens for themselves, if equal; when accomplished, to their accommodation only, they would surely have the best right. No compact, no duty prescribes that they should make and maintain commercial means of intercourse for the general welfare, or keep open such as they may have made, beyond the limits of their own interest. The states may take care of themselves; but the United States, of all. Hitherto, the business of the West had been thought essential to an income proportionate to the cost of public works of this kind; but this apprehension is dissipated by the suc-

cess of Erie, thronged with navigation even before it has reached the Lake. And although the capacity of that canal for business may be increased by parallel locks, and other means, there are limitations to its power, set by the command of water it possesses. Ever since the commencement of that work, the western counties of New York have been increasing greatly in population, and there will be no *necessity* for business from Ohio and Michigan to ensure a competent revenue from Erie canal. The very facts which shew the wisdom of that undertaking, prove that the Western states may find it pre-occupied. The nearest customers must always have the preference. They are in possession. Nor would a canal through Pennsylvania be less occupied. This state, besides being equally fertile, possesses iron and coal. She is favored by nature with great rivers, whose courses converge to the canal route, and must, when effectuated, pour into it a great accession of transport.

It is evident, therefore, that the General Government has an interest in the success of the state Governments—in the effectual and extensive influence of their public works, with which its own co-operates to the same great end. To each it must be best that they should yield a fair income. The revenue is not all in the public good produced; those who use canals can well afford to pay tolls; they are benefitted in a much higher ratio than that charge upon the increased value of the property transported; nor would it be just, in good policy, not to make the income, in time, not only secure the perpetuity of the way, but the interest on the investment, which it would most certainly do, at very moderate rates. If as many boats were to enter as has been assumed in the calculation of the water, it would be $5 \times 12 \times 2 = 120$. If twenty-five tons, then $120 \times 25 = 3000$ per day. If 200 days, 600,000 tons, at two cents a ton a mile, is \$,900,000 dollars, the canal being at least 326 miles.

Finally: in reviewing the whole ground, the Alleghany mountain stretching through the centre of the Union, so far from being a barrier to the most economical form of communication, is, in fact, to be rather considered the great laboratory of that element, which is essential to this branch of the internal improvements in contemplation of the General Government.

The next division of this communication is in relation to the route of canal between the Ohio and Lake Erie, also respectfully submitted.

JOHN L. SULLIVAN,
Member Bd. Inter. Improvements,

Washington, February 3, 1825.

Reconnoissance of the country between the Ohio and the Lake.

While the investigations were proceeding on the summit ground, the Board made the reconnoissance of the country between the Ohio and Lake Erie, in order to designate the most suitable route for a communication between these waters.

The course of the Ohio river, from Pittsburg to the mouth of Big Beaver, is in a direction which approaches the Lake, and that point is found to be the most proximate. With the guidance of a gentleman well acquainted with the district, the Board, after examining the falls, ascended the valleys, diverging for some distance up the Shenango, which was subsequently visited along its upper branches. From Warren, at the head of the Big Beaver, where the branches called the Mahoning, and Silver creek, come in, excursions were made to all the points of essential interest to which our attention was drawn, either by the known topography of the country, or by facts ascertained under the authority of the adjoining states, or by gentlemen actuated by motives of public spirit.

The adjoining township of Champion being the highest ground between the Beaver and Grand river, had been ascertained to be *three hundred and forty-two feet above Lake Erie, and two hundred and eighteen feet above the Ohio.* It became, therefore, as this line has the lowest known summit, a very interesting inquiry, whether a sufficient command of water could be had to make this "the most suitable route," especially, as the gentle slope of the country through Rome, Austinburg, and Ashtabula, appeared to be favorable ground, and the valley of Grand river, for some distance, afford advantages. An important fact had been ascertained by an engineer employed by the state of Ohio, viz. that the Cuyahoga could be led eastward, to the summit of Champion. The distance and elevation of that point, and the quantity of water at command, would therefore decide the practicability of a canal by this route.

We proceeded, therefore, to the Cuyahoga, and ascended to the rapids. At this time there had been no rain for three or four weeks. The opportunity was favorable to determine nearly the minimum quantity of flowing water. The section and velocity of the stream were taken at several places, and the mean of these operations and calculations was $56\frac{148}{1600}$.

We returned by the track which Mr. Geddes levelled, to the head of Silver Creek, where the greatest depth of cutting was ascertained to be seventeen feet, and the distance between one and two miles. We visited Garret's mill, on this stream, where it was found, that 6.070, was the quantity, per second, of flowing water; and at Parkman, a small stream, also, at command, measured $1\frac{3}{16}\frac{3}{16}$ ft. together $63\frac{6}{16}$ being the whole of the natural supply at command above Champion; and it was the opinion of some of the inhabitants, that the Cuyahoga was, at times, a quarter to a third lower than at present.

The length of feeder required would be eighteen miles; the length of canal to be supplied from these sources, would be some distance down the Beaver, aided by the Mahoning, and fifty miles to the Lake; in the course of which it would cross some feeble streams from Bloomfield Swamp, perhaps low enough to receive them. Or, if the line were to descend into Grand river valley, it would be circuitous, and from Austinburg to Paynesville, under peculiar disadvantages, from the washed banks, or high bluffs, of earth, along the foot of which

this stream alternates by sweeps. The line could not leave the valley to attain a termination at Ashtabula.

When the question presented itself, Whether the canal route might not rather ascend to the Cuyahoga, and descend that valley to Cleveland, the first inquiry naturally was as to the elevation of the ground. Mr. Geddes had not levelled up the rapids, and we were left to infer its elevation from the other elevations which he measured, and partly from the conjectures of the inhabitants.

He began on the side of the small lake between the Muskingum and the bend of the Cuyahoga, 404 feet above Lake Erie. His line was run eastward beyond Ravenna, and the ground west of the Mahoning was found to be 149.20 feet above the starting point at the little lake. It was found that the narrow falls of Cuyahoga is forty-nine feet above that point, from whence to the rapids. (the place we visited,) the ascent is estimated at 120 feet, distance fifteen miles. Mr. Geddes continued his line of level from the high ground to Garret's mill. on Silver creek, found to be 58.80 feet below the starting point: continuing on, he found the swamp in Nelson to be 37.80

and Champion below that - 21.

58.80

As Champion is 58.80 below the point of departure, and the Narrow Falls 47 above it, and the fifteen miles ascent 120, as conjectured, Cuyahoga Rapid is 225.80 above Champion, and Champion is 342 above Lake Erie; therefore, 567.80 is the elevation of this line.

This is corroborated thus:

The starting point	-	404
To the Narrow Falls	-	47
To the Rapids	-	120
	<hr/>	
		571

It is true, the number 120 is conjectural; but as the people estimated the fall to be 150, it is set down at 120. To this discouragement might have been superadded the difficult nature of the ground down the Cuyahoga Valley, according to Mr. Geddes' report in print.

It is not our duty at this time to dwell on the advantages which Ohio may ultimately derive from local relations and elevations of the Cuyahoga. It may surely be the means of forming a useful canal eastward, if it cannot adequately supply a canal of the dimensions this communication, prospectively considered, will require.

Subsequently to these observations, the Board followed the line from Warren to Austinburg; thence to Paynesville and the mouth of Grand River.

Returning to Austinburg, we pursued the line proposed to Ashtabula, and viewed its harbor also; the next object was to view the summit ground between the head of the Ashtabula and the head of the Pymatuning, a branch of the Shenango; thence, to the head of that river, and down its valley, southward, to the junction of *Crooked Creek* branch, which

was followed up, northward, to *Conneauti Lake*, which is separated from its head waters by rather low ground; thence, to Lake Erie, descending 470 feet. From the north end Conneauti, the waters running into Erie are separated by a ridge of 15 feet for a short distance. To the lake is 25 miles. To Erie Harbor nearly 40 miles. The nearest point on the Lake shore is at Elk Creek mouth, about 16 miles west of Erie Harbor. An artificial harbor might be securely built here; the bottom is rock, gradually declining from the shore.

To view the line near Waterford, the Board, after visiting Erie, ascended to the sources of supply on French Creek. The elevation of this summit would be 670 feet near La Beuf Lake.

Arrived at Meadville, we availed immediately of the long period of dry weather, to ascertain the minimum of flowing water in *French Creek*, which the Conneauti Lake route is capable of receiving. The operation of measuring it was repeated several times, and the mean of these measurements found to be 230 cubic feet per second, which is considered to be abundant, especially as the plan of the work will probably include the waters of Conneauti Lake; and, if necessary at any future time, it may be raised, and make a reservoir of five miles in length, and nearly one in breadth, if found, on investigation, that it would fill.

This source of supply being the only one amply sufficient, would seem, of course, to prescribe the route nearest to it, as *most suitable*; and we saw no difficulty in making a canal from the mouth of Beaver to the mouth of Elk, in the distance of a little more than one hundred miles.

Having thus accomplished the reconnoissance, we divided our party, and Col. Totten descended the Alleghany to make a chart of that river, the distance from Franklin to Pittsburg being 109 miles, and there are 45 rapids in its course. On re-assembling at Pittsburg, it was deemed expedient to preserve the information thus acquired for future usefulness, embodied in the form of instructions for surveys, and to place them on the records of our transactions as a Board; but not, (on my part,) as expressive of the opinion that it would be of essential importance to execute them all. The line of communication depends upon the command of water, and it is evident there is but one route where it is found in sufficient quantity.

The next division of this illustration of the general subject, is on the co-operation with the Pennsylvania Commissioners, also respectfully submitted.

JNO. L. SULLIVAN,
Member Board Int. Improvement.

Pennsylvania Reconnoissance.

In conformity with the orders of the Secretary of War, the Board of Internal Improvement, in their way to the Eastern states, met and co-operated with the canal commissioners of Pennsylvania in making a reconnaissance of the country from the Ohio to the Schuylkill.

To convey a general idea of this route, it is necessary to recall to mind the great features of the country.

At the distance of thirty miles, by the course of the Alleghany, from Pittsburg, the Kiskimanitas, whose upper eastern branch is called the Conemaugh, comes in from the east, that branch heads opposite the Juniatta (itself a branch of the Susquehannah); and, both to the east and west of the Alleghany mountain, are seen others, ranging transversely to these rivers—the Chesnut and Laurel on the west, and many on the east, which divide Pennsylvania into fertile valleys; while farther beyond the Susquehannah, Dauphin, Lancaster, and Chester counties exhibit a milder aspect of country.

This route naturally divides itself into four sections: 1st, from Pittsburg to the mouth of the Little Conemaugh, computed to be 128 miles; 2d, thence, to the forks of the Juniatta, 40 miles; 3d, thence, to the Susquehannah, 110 miles; 4th, thence, to the Schuylkill, 125 miles. The whole 403 miles.

The first section has favorable ground along the river, on alternate sides, for a large proportion of the distance, presuming the substratum will be found tenacious ground. The principal exceptions are the ravines of Chesnut and Laurel mountains, one five, the other seven miles through. It will often be a question of expediency for skill and calculation, to decide whether to carry the line along the declivity of steep shores, or to cross by an aqueduct to a more favorable ground for a distance, when the same alternative will again present. For this section, which, from its elevation at the eastern end, gives to the stream the characteristic of a torrent, and precludes improvement of the natural navigation, there will be water in abundance for a canal.

Beside the tributary streams, which are considerable, Stony brook was found to discharge, at Johnstown, at this time, not indeed the lowest state of the river, 239 cubic feet per second, and the Little Conemaugh, near its mouth, 100 cubic feet per second.

The second section includes the Alleghany mountain; and here the question of how much water is in its natural flow at command, or may be had in reserve in the driest season, becomes an inquiry of the greatest moment: our view was indeed cursory; but so far as the investigation was carried, may be considered essentially accurate.

One of the Board, Mr. Sullivan, had been accidentally detained half a day at Pittsburg, and crossing the country to fall in with the party, had reached this place before them, and preceded the rest of the company, attended by Mr. Livergood, one of the most respectable of the inhabitants of Johnstown. At three miles from this place, up the Little Conemaugh, Hildebrand's mill is situated. The owner, Judge Hildebrand, was asked how the present state of the water compared with

its lowest state. His reply was, that in a dry season, such as we had lately had, there was just enough to carry his two grist mills. The measure of his flumes, compared with the result of a measurement of the water as now flowing, would give the minimum and the medium quantities. Each gate was found to be 33 inches wide, its hoist $4\frac{1}{2}$ inches, head of water 3 feet. According to the formula of Du Berat and Dr. Robinson, the quantity discharged is thus found: depth to the centre of gate 3.188 feet; the square root of which being 1.785, which multiplied by $8.02 \times (\text{by area}) 1.03 \times 82$ (*vena contracta*), gives cubic

$1,000,000,000$

feet 12.093 per second.

12.093 the same for the other gate.

24.186 feet is therefore the minimum quantity.

The race was found to measure at its entrance 7 feet in width, and 2 feet deep, the velocity 100 feet in 80 seconds, which, according to Prony, is 14 feet.

According to Du Berat,	13.56
	<hr/>
	27.56
	<hr/>
	2

The mean of which is 13.78 per second.

The discharge over the dam was at this time three inches deep, 180 feet in length, which according to the formula given in Robinson's Mechanical Philosophy, is $2.226 \times 180 \times 12 = 61$. = 80.136 feet. Or by another formula. 5.19, the square root of the

cube of the depth, $\times 180 \times 12 \times 11.50$	= 74.600
	<hr/>
	154.736
	<hr/>
	2

The mean is 77.368, and plus 13.78, gives present medium quantity 91.148 feet at Hildebrand's mill, which is almost four times the minimum delivery.

The next day the gentlemen who were ascending the river reached Johnstown, and, proceeding up the Little Conemaugh, measured the stream at the forks, about six miles as the stream runs above the mill.

The south fork was found to contain 43.87 feet

The north fork	59.02
	<hr/>
	102.89

The evaporation in the course of that six miles very well accounting for the difference.

The whole party having joined at Ebensburg, excepting Colonel Totten, whose military duties had called him away, we proceeded to measure those streams which are nearest the top of the mountain, or those of them which were most immediately relied on.

Ben's Creek comes in one mile below Lilly's mill, and the Little Conemaugh was found to deliver immediately below the junction 11.640 feet—at Lilly's mill, 7.098

On the eastside of the mountain, Blair's Gap Run, 3.370

North Brook, 1.873

5.243:

Together 16.883 f. per second.

The Commissioners had not yet had time and opportunity to investigate the value and local relations of the other streams in this vicinity, as they did at a later period. They state in a letter to the Board, of the 16th November last, that the Beaver Dam branch of the Juniata, being surveyed, would afford the head waters of Burgoon's Creek, dividing into Kitanning Run, Old Gap Run, Sugar Run, and Blair's Creek, draining the eastern side of the Alleghany for ten or twelve miles. On the west side, the heads of the Little Conemaugh, composed of Trout Run, Laurel Run, Ben's Creek, Limestone Run, Beard Rock Run, M'Closky's Run, and Laurel Deep Run, derivable by feeders from the distance of fourteen miles, all of which the commissioners state to be more than *forty* cubic feet per second; they also describe favorable situations for reservoirs.

Perhaps no branch of practical civil engineering is involved in more difficulty than the calculation and construction of reservoirs and feeders. We have not, on this occasion, that intimate knowledge of the local circumstances ourselves necessary to appreciate or to doubt the persuasion which the commissioners express. While our respect for them, as men of sound judgment, on the one hand, inclines us to believe much may be done on this part of the section; on the other hand, our recollection of the practical difficulties, occasions a degree of doubt and hesitation to concur in the confidence they express.

The length of the tunnel requisite, and the elevation of the ground above the tide are sufficiently well ascertained; if the summit level, or tunnel, be below the level of Lilly's mill, (and it will be of consequence as to the supply of water to place it low) its length will be 1407 perches, and the line, it is found, will be above Frankstown 919 feet.

Frankstown, above Harrisburgh,	-	-	-	-	576 feet.
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Harrisburgh, below the summit level, between Lancaster					
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and Chester,	-	-	-	-	-	209
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'Thence to the side,	-	-	-	-	-	519
----------------------	---	---	---	---	---	-----

2214

'The commissioners also state that the descent to the fork of					
---	--	--	--	--	--

Conemaugh, is	-	-	-	-	-	349
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And thence to Pittsburg, (759 above tide,) -	-	-	-	-	-	688
--	---	---	---	---	---	-----

3251 feet.

The inquiry, how much water a canal requires in situations and seasons exposed to those causes of evaporation and soakage which are active, and, in a degree, uncertain, is answered with no little difficulty, even from experience. Take, for example, the five most complete and noble canals in France, the country whose climate most resembles our own; and take, also, Erie canal, in its middle and most unexceptionable portion, we find they differ from each other, probably being through a rough country, in some instances, and constructed with more or less precaution. We know of no better rule than the average of these canals, viz.

De Briare,	6 m. 40ft. wide, 4 ft. deep, see 128 ft. uses	62.60 pr. m. pr. min.	
Languedoc,	69 64 "	7½ " 375 "	lockage 5.80 lockage 17 56.80
Du Centre,	69 47 "	5½ " 215 "	55.60 " " 9.74 45.86
St. Quintin	32 54 "	5½ " 252 "	70.70 " " 10.52 60.58
Narbonne	61 64 "	7½ " 375 "	68.80 " " 17 51.80
Erie,	141 40 "	4 " 136 "	121 " " 6.16 114.84
			414
			69
		6 pr. m. pr. min.	58.13 $\frac{2}{3}$ evap. or soakage

For evaporation, soakage and lockage, 69 feet.

But we do not know how much was used in the lockage, except in the instance of Languedoc, on which the average of six years was 1920 boats, its locks being 100 f. 20 f. wide, 8 feet deep = 16000 f. \times 1920 = 30,720,000 cubic feet \div 365 = 841 644 per day, 12 hours is 1169 per minute \div 69 miles = 17 feet per mile per minute nearly. Now, assuming that the others have proportional lockage, and that the size of their locks are in proportion to their size, or section, the deduction must be made as above for their lockage, respectively, leaving the nett expense of water for evaporation and filtration; the average of which is seen to be 58.13 per mile per minute; this average is more favorable than the experience of Erie alone, as it has been stated by one of the Engineers on that work, we do not know from what data, or with what correctness, not having had yet an opportunity of personal verification thereof.

That 61 miles from Rochester to Seneca receives	6000 feet.
11 " the Camillus Level,	" " 2000 "
69 " the Rome Summit	" " 9000 "
141	17000
Or per mile per minute 120	

.57

Applying this experience to the second section and the size of the locks in contemplation there, and assuming the summit and adjoining levels to be from the forks of the Conemaugh to the forks of the Juniata 28 miles, the calculation would stand thus: $28 \times 58.82 = 1627.$ 64 per minute per mile, for evaporation and filtration, the locks 80

by 11 by 8 feet + 20 (waste) 8448.10 per hour, 34480 per minute
1408 feet.

$$\begin{array}{l} \text{Consequently, } 1647 \text{ per minute} \times 60 \times 24 \times 90 \text{ days} = 210,942,144 \\ 1408 \quad " \quad \times 60 \times 16 \times 90 \quad " = 121,651,200 \end{array}$$

Cubic feet,	-	332,593,344
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Admitting that the branches of the

Little Conemaugh - 102.89

And the stream near Lilley's mill 17 could be brought in,

We must reduce them to the minimum of $\frac{1}{4}$ or 30 feet.

$30 \times 60 \times 60 \times 24 \times 90$ amounts to 233,280,000

Shewing the quantity by reservoir to be 99,313,344 feet.

One mile square 8 feet deep, with due allowance for evaporation, the feeder being short, would probably be sufficient.

It should not be expected that evaporation will cease during night in tunnels, as the air draws through them, nor that they will be exempt from soakage. The hydrostatic pressure which they are liable to produce on the fissures of rocks, may possibly occasion as much loss of water as they gain by the percolation from above their level; and as the Alleghany falls off very steep towards the east, compared to the declivity of the country west, it will be prudent rather to make their tunnel low than high; though at the expense of its greater length. The commissioners state, that the mountain, in many places, exhibited strata of rock in a horizontal position, mixt with clay, which are not unfavorable indications.

Section 3. The country down the valley of the Juniatta continued generally to wear a favorable appearance, unless it be where the mountains range transversely to the course of the river, when the shores rise steep and high, covered with a vast aggregation of the fragments of rock. These, however formidable to the eye, are to be considered rather as masses of rough materials broken up to hand, in readiness for the high and strong walls with which the canal will have to be supported, above reach of the freshets. In this place it would seem an omission not to notice the improvement of the Susquehannah down to the Chesapeake Bay (in progress by the joint exertions of Maryland and Pennsylvania.) The commissioners, in their report to the Secretary of the Commonwealth of Pennsylvania, express great satisfaction that the commissioners of both states, "are unanimously of opinion that an ascending navigation is practicable, although there may be some difference of opinion as to the ulterior measures that may be most expedient, and the expense required to accomplish it." The commissioners have taken considerable pains to form an opinion upon the best ground within their power, of the probable expense of the ascending navigation, at the same time they would have been highly gratified to have had the opinion of a skilful engineer. They have, however, come to the conclusion, that a less

sam than two hundred thousand dollars will be sufficient. While it must be a gratification to see the strong probability exhibited in the report of the ultimate success of the improvement of the Susquehannah, giving access from the north to Baltimore, it will be still kept in view that the western trade will be necessarily by canals, in bottoms not adapted to the Chesapeake, and that access to that market from the west, must be more convenient by the Potomac route.

Section 4. The Susquehannah, at the junction of the Juniatta, appears to be about half a mile wide, and is full of ledges; the current must, here, at times, be extremely rough, but the only danger to which an aqueduct would be exposed is the same to which bridges on this river are subject, viz: the lodgment and accumulation of ice, and the consequent rise of the water.

The ground from Clark's Ferry to Harrisburg, 14 miles, appeared to be generally level; thence, to Middletown, also favorable. To view the line which the commissioners had been exploring through Lancaster county, we accompanied them to the villages of Elizabeth, and Manheim, taking the gauge of the branches of the Chickisaleng, three feet, and our opinion was, that the plan of running one or more feeders to the head branches of the Conestago, of a navigable size, would be both useful and essential.

On this part of the line two alternatives seem to offer in the direct course, either to rise and descend a ridge of land between the Chickisaleng and the Conestago, or pass under it by a tunnel of about one mile. A tunnel is now of such common occurrence in civil engineering, as to oppose no obstacle, if the expense of it is none in comparison with the object of the work; and even the expense and time may be essentially diminished by the employment of steam engine power to raise the earth through shafts opened perpendicularly at different distances for this purpose.

We regretted the wetness of the season had not permitted the commissioners to remark the lowest state of the water that ever occurs, through this part of the county of Lancaster; we could not at the time we saw the streams, form a decisive opinion. We crossed the Conestago, near the city of Lancaster, where it runs, as it does in fact, for a long way in a deep bed. The line then led over into the valley of Mill Creek, and afterwards gains the valley of the Pequa; and reaches the ascent to the passage into the county of Chester, in about 14 miles from the city. The ground ascends gradually, for one mile, till it reaches the proposed level of a tunnel under the gap of the mountain about 72 feet below the surface, in conformity with the ground on the south side thereof, and 150 feet above the general level of Lancaster. The supply of water relied on for this part of the canal, is principally that of Buck Run, and the west branch of the Brandywine, with the head waters of the Octorara. The head waters of Pequa, also, on the north side. These streams were all so much more abundant at this time than they are at midsummer, that we did not think their measurement conclusive, though made in some instances. The west branch of the Brandywine was found to deliver

(with some allowance for the forge above the spot) 50 feet per second. The east branch of the Brandywine crosses Chester valley, a few miles more to the east, in a deep bed. That valley being well known to extend to the Schuylkill, with very little interruption of ridges of no considerable elevation, had drawn attention at a very early period, as favorable to canal communication. But the commissioners, in accordance with our own judgment, were decided to reconnoitre a more southern route; as the former necessarily falls in with the line of the Schuylkill navigation, without a legal right to supply from that river, it being already appropriated, we don't know with what limitation, to the works of that incorporation. It would be necessary, perhaps, to cross the Schuylkill to gain near Morristown the old line, began by the late Robert Morris, which entered Philadelphia at the elevation of the highest street in the city. On the other, more southern line, it was thought that a canal might reach the city of Philadelphia at about the same elevation, crossing the Schuylkill by an aqueduct near Gray's Ferry, or more southerly coming into the city, not far from the Navy Yard.

We therefore proceeded down the valley of the West Brandywine to its junction with the main branch near Jeffriesford, where we took the gauge of the stream (53.43) and crossed the ridge of land dividing this river from the west branch of Chester river, which runs generally eastward till it unites with that stream; the line afterwards crosses *Ridleys, Crum, and Darby Creeks*.

The practicability of this line will depend on leading water from the Brandywine, and our impression of this route was so favorable, as to induce us to suggest to the Commissioners in a letter, the investigations necessary to decide the most material points. Thus the fourth section, except so far as the Susquehannah water may be made use of, appears to depend on streams already much occupied by mills and manufactories. This obstacle is not, however, insurmountable. The vast importance of Canals to the whole community, is generally acknowledged. But mills are of great utility: to extinguish them, would be a loss to the community of equal value, and be attended by great inconveniences. Could these great interests be reconciled, which is not improbable, by a method of passing from level to level of a Canal, without using near so much water as locks require—and by reserving water for the canal, when, otherwise, the superabundance on the stream would run to waste, Pennsylvania might have the benefits of canal communications without disturbing the mills near their course; but, on the contrary, affording them the facilities and savings attendant on water carriage for the raw material, and from greater distances, and permitting of a greater profit on the manufactured article, a system of peculiar importance to Pennsylvania. On reviewing the whole ground, so far as the facts have been developed, there is scarcely sufficient reason to believe, that the summit level of the Alleghany mountain, and the Lancaster and Chester line, can command water enough for a canal of great capacity.

But it is evident, Pennsylvania has great means and resources for inland navigation, with or without the aid of the General Government; and it is hoped that their co-operation with the Commissioners, though so limited in time and extent, will have been of some little use in promoting the public works, in contemplation of the state government.

The next division of this communication is on the New Jersey route—also respectfully submitted.

JNO. L. SULLIVAN,
Member of the Board of Internal Improvements.

Analysis of the preceding pages.

- 1st. Or western section up the Kiskiminitas.
- 2d. Section across the Alleghany mountain.
Calculations of water.
Length of tunnel.
Elevation of ground.
Application of the principle of computation of expense of water on canals.
- 3d. Section down the valley of the Juniatti.
The Susquehannah improved.
- 4th Section The Dauphin, Lancaster, and Chester line to Philadelphia.

Reconnoissance in New Jersey.

In pursuance of the orders of the Honorable the Secretary of War, the Board proceeded to meet the canal Commissioners of the state of New Jersey, and viewed the ground contemplated as the route of a canal between the Delaware and the Raritan.

The Board proceeded with them to the examination of the depth of water in the creek at Bordentown, and then to a point on the Delaware, twenty-six miles above Trenton, ascertained to be at an elevation correspondent with the summit level of the canal as proposed to be located to Brunswick.

The length of this feeder must, however, be considerably greater than that distance, as it must several times recede from the river, pass around the valley, and return to be carried along the spurs, which rise steep and rocky, not far from the shore.

The Board, on gauging the mill streams which cross the canal line, were satisfied that a feeder, from the Delaware, would be indispensable to a lock navigation, and to a canal of dimensions correspondent to those which are in process of execution to connect the bays of Delaware and Chesapeake, and the latter with the Albemarle Sound.

The tide of the Raritan is rapid—its channel is crooked: vessels navigating the tide waters will generally be impelled by the wind. To give them access and avoid delay, this canal, if a national work, should be extended as far as possible, and with as low a summit level as may be possible, that the difficulty and extent of the feeder may be less.

In passing through New Jersey, at a later period, it seemed probable that a direct line between Amboy and Bordentown, might be found practicable, with a deeper excavation of the summit; requiring, consequently, a less expensive feeder from the Delaware.

This route might not interfere with the existing project under the authority of the state Legislature, and an opportunity be found of making a canal of the width and depth of the others parallel to the seacoast.

The Board have already agreed in expressing an opinion that a survey would be useful to determine how far the canal may be extended down along the Raritan. It is further my own conviction, that the ground between South River and the creek at Bordentown, should be investigated, as the shortness of the feeder and favorable ground towards the east, may warrant the reduction of the summit.

The following division of this communication is on the canal routes examined in Massachusetts, also submitted by

JNO. L. SULLIVAN,
Member Board Internal Improvements.

ANALYSIS

OF

THE FOLLOWING ILLUSTRATIONS

OF THE

Massachusetts Reconnoissance.

The notoriety of the route.

Description.

Tides.

Plan and execution.

Back River harbor.

Herring Pond.

Former estimate.

Winter.

Sands.

Harbors.

Commercial consideration.

Objects of further investigation.

Barnstable, Hyannis, and Yarmouth.

Narragansett Bay and Boston Harbor communication.

Description.

Considerations on commerce and defence.

The Massachusetts Reconnoissance.

In pursuance of the orders of the Secretary of War to the Board of Internal Improvement, they proceeded to Massachusetts, to make an examination of the grounds between Barnstable and Buzzard's Bays, in accordance with the memorial of the delegates of that state, addressed to the President on the 4th May, 1824, in compliance with a resolve of the Legislature of the 21st January, 1824, strongly representing the national importance of a communication between those waters, and clearly elucidating the valuable effects thereof, both in regard to domestic and foreign commerce and naval operations.

The public attention had been drawn, at an early period, and with greater interest, as the coasting trade increased, both to the narrowness of the Isthmus, and the favorable circumstances of the ground. Accurate surveys of it had been made both at public and private expense; and provided with the maps and reports from the archives of the state, and with the use of others, politely loaned by the proprietors for the occasion, the Board went upon the ground with a knowledge of the most essential facts, and aided with the judgment of all who had preceded them: but it not being within the scope of their commission, at this time, to form a definitive plan of the works, and to make an estimate of the cost, but rather to form a decisive opinion of the practicability of the canal, and to acquire a knowledge of the route requisite to direct the execution of surveys necessary to the final plan, a brief description of the intervening country will make the subsequent remarks more intelligible.

At this place, the Rocky Ridge, which appears to occupy the nearer portion of Plymouth county, and extend eastward along the middle of the Isthmus, discontinues for about one-fourth of a mile, and a long narrow valley exists, which, including the marshes on the north, measures eight miles. The highest ground in the route is a plain of nearly one mile in extent, 33 feet above low water mark on the Barnstable Bay side. Two small rivers flow in opposite directions in this valley. The Scussit rises on the north side of the plain, in a bog of some extent, and, in its course, has fall enough to carry a mill situate thereon. The Monument has its source in Herring Pond, a large expanse of water, situated on the west side of the valley, and 40 feet above it. This stream enters about the middle of the valley, and flows to Buzzard's Bay.

The summit ground has not, to our knowledge, been bored or searched by sinking shafts. How much it may partake of the nature of the adjacent country, remains to be ascertained.

The tide is three hours *latest* in Barnstable Bay, and rises eight feet in neap tides, nine feet in common tides, and twelve to thirteen in Spring tides. Low water mark is eight inches *lowest* on this side; on the south side of the Isthmus it rises three to five feet, or, more accu-

rately, full tide is four feet three inches six-tenths higher, relatively, than high water in Buzzard's Bay.

A canal may, therefore, be excavated and drained to the low water mark, and carry eight to nine feet, and sometimes twelve feet, filled, continually, by the tide, and kept full by the gates of the locks which must occupy its entrances. The northern entrance, from the Bay, must be protected by a break-water, or pier, forming, to some extent, an artificial harbor.

Examples of this kind of construction are numerous in Europe; and, in this Bay, we have one to the extent of several hundred feet at Cape Ann. The bottom off Sandwich is found to be good anchorage—three and a half fathoms are found at one-third of a mile, or three fathoms are found 250 fathoms from the shore. Immediately within the beach it would be easy to excavate, in the Salt Marsh, a basin, for shipping to wait a favorable wind, and, by means of a dam near the mouth of Scusset Creek, to include a body of water so extensive as to supply the lockage without materially affecting the level or depth of the canal.

To render this passage at all times useful, it will be necessary to enter and leave it at all times of tide. This can only be provided for by carrying the lock out beyond low water mark, placing it in depth sufficient to float a vessel into it at *low water*. This lock must, therefore, be of double the usual depth, or there must be two of them in succession. The construction of locks, in a situation thus exposed to the action of the sea, is no doubt attended with some difficulty. The usual resource of the Coffer Dam is impracticable here. In two similar situations in Scotland, (except in exposure to the open sea) they projected a mass of earth, and excavated for the lock therein. But here the very nature of the adjacent country forbids this method as well as the waves of the ocean. In one of the reports which had been made, it was contemplated, as most expedient, to line the lock with plank, and make it tight by caulking; but, although this might answer, and be easily executed, if the lock is placed wholly above water at low tide, and consequently operative *only at the moment of high tide*, it would not be conveniently and securely done for a deep lock. Cemented walls cannot be built under water. Perhaps there remains, therefore, but one method, which is to build the lock above water *wholly*, and place it between the strong rough walls, which should be previously built to receive, sustain, and protect it.

If this were to be the mode of construction, and *wood the material*, the next question would be, both how it should be made durable, strong, and perfectly tight: the answer would be, that this structure should be built *over* the situation prepared for it, and lowered into it complete when the previous arrangements being made, it might be permanently secured, or it might be built like a vessel on shore, and launched, &c. The manner of constructing it for tightness and durability would be, in preference, the *new method* of ship building in England, by successive layers, transverse to each other, interposing tarred canvass or paper, the materials then become posited in their greatest strength, perpendicular to the fibre, while the resinous substances exclude the

air as well as water, being drawn together by as many trenailings or nailings as there are layers, except one, and as many thicknesses may be given to the bottom or to the sides, it is necessarily strong and durable.

There is still another method, however, which was resorted to at Venice in the construction of naval docks. That of building a caisson, and then, by the erection of the walls within it cause it to settle, and finally to sink, thus loaded, into its place. This method would, in our case, be attended with more expense, but is not impracticable. The caisson might, on that occasion, be built of lamina, as described for the lock chamber.

In a communication of this importance, one lock or entrance of the large dimensions necessary would scarcely be a sufficient accommodation, and two would be a guard against interruption from any temporary accident.

The adjacent shores furnish an abundance of rock for the construction of piers. The shore is bold, and at the distance of 250 fathoms, is deep enough to float any ship that could pass through.

The engineers heretofore employed on the survey of this route, traced a line of canal to Back River Harbor, half a mile west of the mouth of Monument River. The harbor is found to have 11 to 17 feet at low water, the inner harbor eight feet; but there is a sand bar between the former and the bay, extending from Toby's Creek to Marshner's Island, which has eight feet at low water. If a channel were to be cut through this bar, vessels might, of course, enter at all times; but vessels drawing fifteen feet would be the largest that could enter at high water safely, and then would ground at low water.

Perhaps the depth of this harbor is the best rate for the depth of the canal, unless the locks should be carried beyond the inner shoal and the outer shoal removed, when there would be 17 to 20 feet at the entrance.

The water from Herring Pond appears to have been relied on in some measure to supply the canal. It is supposed to have an area of four square miles; at this time the outlet afforded but $10\frac{164}{1600}$ cubic feet per second. This pond, however, as a reservoir, may be occasionally very valuable. If it could be raised, or if the outlet (of which there is less doubt) were deepened, four square miles four feet deep, reduced by evaporation to three feet, would amount to 334,570.200 cubic feet. Should the canal be 80 feet wide and eight miles long, its area is 3,379,200 square feet; that quantity would raise the surface of the canal four feet 24 four times, six feet 16 times. The section of such a canal would be 650 feet, the prism 22,256.000. The reservoir would hold 15 times the prism. The upper section of the Languedoc canal for the whole year uses eleven prisms of its contents.

Applying the rule of estimate we have, in the early part of this report, shown to be according to experience, viz: 58.13 per mile, per

minute, for evaporation and soakage, and allowing this canal to be double width, and usual depth above tide

58.13 × 16 × 60 × 12 hours	= 669,600 per day.
Lockage three locks per hour, cubic feet, 30,000	2,160,000

Cubic feet per day	<u>2,829,600</u>
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The reservoir would, therefore, provide for 111 days an additional depth of five feet.

These calculations are intended to show the importance of an accurate survey of Herring Pond, and an investigation of its capacity and capability of being converted and improved into a reservoir.

Although not charged with the duty of making an estimate of the expense of this work, it may be acceptable to the Department to learn what estimates have been made on former occasions. These appear to be respectively as follows: 427,000 dollars, 417,000 dollars, 492,000 dollars, 400,000 dollars; the latter including three steam boats for towing the vessels and breaking the ice. Their plan did not probably include the breakwater and some other particulars referred to; nor a canal of those noble dimensions we have been supposing.

The winter, if very severe, may close the canal for a short time. It is very rare that Boston harbor is closed, *even for a short time*. At such times the active exertions of steam boats, equiped with ice-breakers, as suggested by Mr. Jones, for the Delaware, would keep Back River Harbor clear, and one which should break up the ice in the canal, would also be useful in assisting vessels through against the wind.

Some apprehension has been entertained that sand might accumulate at the entrance of Barnstable Bay. It appears, on inquiry, that there is a constant progress of some sand from west to east, from Monument Point; and from southeast to northwest; also from the same towards Plymouth, and by this course, Scusset Creek had been gradually gaining east. In twenty-two years it was said its mouth had shifted 300 yards, but there can be nothing to apprehend from this cause, since, by allowing the canal to drain off occasionally, its entrance would be cleared, but the operation of the lock would alone keep it so.

Some few general remarks upon the navigation may not be misplaced.

The harbors on Barnstable Bay are Province-town and Wellfleet, for large vessels; Barnstable is accessible at all times for coasting vessels; Plymouth is accessible also for large vessels on the west side.

In coming up Buzzard's Bay there are three or four good ship harbors. It is well known that the prevailing winds of the spring are easterly, of the autumn westerly. In going over the shoals or in doubling Cape Cod, there must be a shift of wind to gain any port from Plymouth to Portland. Vessels bound to them make some of the harbors of the Vineyard sound, and are sometimes, after sailing

with a fair wind, met by an adverse gale before they reach their port, and after being driven around Nantucket Shoals regain the sound to make a new effort. But the same wind that would carry a vessel into the Vineyard, would carry her up Buzzard's Bay and through the canal to Boston Light, and all the other eastern harbors would be under the lee bow, with a northwest wind running from the canal.

The importance of this canal communication is illustrated by reference to the number of vessels which pass Cape Cod in a year. It was on a former occasion ascertained that, in the year 1791, six hundred passed. It appears now, in the memorial of the delegates of Massachusetts referred to, that, in 1823, there were 5000: and it is stated that 2,500, averaging 100 tons, would pass the canal in a year, immediately after this passage should be opened. Indeed, the saving of insurance would be such as to induce freighters to stipulate with masters of vessels that they should use the canal, or the preference given to those who did so would render it necessary that all should, for the saving in distance would be 200 miles between New York and Boston, and still more *in time*, as one is a circuitous and the other a direct passage. Indeed, the masters of vessels would have other interests in it, the saving in *pilotage*, in *wages*, in wear and tear of their vessels. Mercantile men of the first intelligence calculate that 50,000 dollars would be annually saved in wages only. The saving in premiums of insurance would be a very great sum, as few coasters load between Boston and New York with less value than 10,000 dollars, and often with cargoes of 100,000 dollars. 2,500 vessels of the average value of 20,000 dollars would be fifty millions of dollars, upon which a saving of one half per cent. would be 250,000 dollars. It is evident, therefore, that owners could well afford to pay a toll for this facility and safety of passage.

It is scarcely necessary to remark, after the exposition of the commercial advantages of the passage described in the memorial, that the increasing intercourse between the northern and southern and western states, as their respective resources of wealth are developed, has given a consequence to this more immediate communication that it never before had attained; but which is equally appreciated by Connecticut, New York, the middle and southern states, as by Massachusetts.

It remains, therefore, to designate the investigations, essential to be made, to form an estimate of the expense of this improvement.

1. The external or visible circumstances being known already, to ascertain the nature of the ground to the depth of the proposed excavation.
2. The nature and extent of the bar at the entrance of Back River.
3. The nature of the ground or bottom of Monument River, whereby, possibly, much excavation may be saved, compared with the route to Back River.
4. The proprietary of the soil; the mill-sites, and the pond; and all

other property affected by the proposed work, and the dispositions of the owners.

5. A survey of Herring Pond and its outlet, with all the local circumstances connected with it, and its value, or history of its state within the memory of the neighboring people.
 6. An inquiry whether any other sources of supply exist in this vicinity, and if so, lines of level run, to determine the practicability of their accession.
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Remarks on the Barnstable Harbor route.

The inquiry whether Barnstable Harbor, and Hiannis' roads, might not afford a preferable route of communication, having heretofore received some share of attention, the Board conceived it would be in accordance with the spirit of their commission to view this line. They accordingly visited Barnstable, and, accompanied by several gentlemen of that place, crossed the Dividing Ridge, about eighty feet above tide, and found the plain to the south beyond it, four miles to Hiannis' Harbor, apparently thirty feet above tide; returning by the line of ponds, which occupy a considerable part of the distance, they were not found to have any visible outlet, and would afford no supply for lockage: the circumstance of the existence of such high ground, and the more eastward situation of these places, considering the object of the two Governments, were conclusive. But while at Hiannis, some improvement in it as an anchorage, was pointed out, and may be worthy the attention of the Government at some future day.

It was suggested that the ground was low and favorable between Barnstable Harbor and Yarmouth Harbor; but the circumstance of the former being at the bottom of the bay, and it being, therefore, subject to the inconvenience of vessels having to beat out against a northwest wind, precluded further investigation, under the discretionary orders, and the limited time in our power to command, at the season of these remarks.

Massachusetts second route between Narragansett Bay and Boston Harbor.

The general import of the order of the Secretary of War, in regard to other routes than that of the bays already described, was understood to refer to one which had received the sanction of the Legislature, so far as a survey, at public expense, could designate it. Public opinion had, indeed, long held in view the connection of Boston Harbor with Narragansett Bay.

Since the establishment of a Navy Yard at Charlestown, as one of the principal depots, it has begun to be thought of national interest to connect it with Newport Harbor, which is the only one on the coast accessible with a northwest wind. Its approach being so safe, its entrance so immediate from the open sea, its position so defensible, that a communication with the harbor of Boston would, in time of war, be in effect to give extension to the power of that establishment. It would have two entrances far apart by sea, but be practically one, by this canal. The history of the late war has proved that it is no easy operation to blockade for any length of time either of these ports. American frigates sailed from them while squadrons were off; an obvious reason is, that an easterly gale compels them to haul off to sea, and a change to the west *puts them at a distance and to leeward.* A navy must, therefore, be far more efficient equip't at these ports than at any others. A ship entering Newport to refit would be supplied from the navy yard with every thing required in a short time; and instead of a passage round Nantucket Shoals, she would be equip't for sea again in almost as little time as it might have required to get well into port if she had made the coast in the latitude of Newport.

In a commercial point of view this communication will be also of value in time of war. The less vulnerable a nation makes herself in her domestic resources, the more powerful and independent in relation to other powers. The continued prosperity of the people at home will be felt in their strength to carry on war abroad. It is thought that Long Island Sound, as well as Chesapeake Bay, may be protected by active steam batteries. The Bay and Sound being kept free and open, this communication becomes a part of the chain extending from the seat of government in New Hampshire to the southern states, and ultimately to the western states.

The states contiguous to Massachusetts have an immediate interest in this improvement; by it their intercourse with the city of Boston would be by water carriage, and Connecticut would have the choice of the two great markets for all produce. Indeed the interior of the state of New York is not without an interest in this facility of communication, with a place already supplied circuitously with flour in some measure from thence.

The manufactories of iron and cotton in Rhode Island, and between that state and Boston, supply, at this time, a transportation estimated at forty thousand tons.

The description of this route may be briefly made. The entrance of a canal in this place would be *twelve miles* from the navy yard: thence to the tide on Taunton River, *twenty-four miles*; thence, by sloop navigation to Newport, *forty miles*, the whole *76 miles*.

Ascending the valley of Weymouth river, the summit ground at the distance of about ten miles, is found to be in Howard's meadow, 188 feet above high tide: from thence the country declines gently to the tide near the course of Taunton River. The supply of the canal will depend upon streams which issue from certain large ponds. In,

mediately on the proposed line we have Braintree Great Pond, but it is twenty-three feet five inches below the summit. It will be necessary to reduce the summit level to a conformity with this source of supply. It discharges, per second

25.14

Weymouth Great Pond, 507 <i>areas</i> , had, at this time, been drawn down by mills, and discharged only	- - -	2.50
Cranberry Brook	- - -	2.50
Trout Brook on the south, estimated	- - -	5.00
		<hr/>
	Feet,	35.14
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But there are other ponds in this part of the country which are probably at such elevation as to co-operate with these. Those already mentioned are capable of being raised and made reservoirs. It is always safe and of certain effect to raise the surface of *natural* reservoirs. There is a rational probability that an increased pressure will not cause escapes to appear.

The general aspect of the ground was strikingly favorable to a canal, and the terminations of it may be easily made in *deep water*, so as to avoid waiting for tides.

The cursory view which the Board had only an opportunity of taking, left an impression of the great utility of this work, if it can be effectuated.

A general and thorough survey appears to be wanting, before this canal can be considered practicable on a scale commensurate with the national purpose.

All which elucidations and explanations are most respectfully submitted, by

JNO. L. SULLIVAN,
Member Board Internal Improvement;

